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MODEL AIRPLANE NEWS

SEPTEMBER 1955—35 CENTS

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WHAT MAKES A CHAMP?

Set your sights on the Nationals—be a champ yourself by following the example of champs. Below are some of the winners of the 1954 Nationals, and what THEY used to win. 27 first place winners used TOP FLITES and POWER PROPS, more than the other 4 makes combined.

Detroit's Rod Pharis took the Junior Stunt Event with his Fox 35 powered Jupiter—a beauty of his own design. He used Power Mist fuel and a **10-5 TOP FLITE prop.**

Winner of the National Stunt Open was Don Still of Beaumont, Texas. His impressive semi-scale Stuka was powered by a Fox 29 engine using O & R Hellzfire fuel. The prop was a **9-6 TOP FLITE.**

The Class ½A Scale Open was taken for the second year by Detroit's Ed Stoll and his beautiful Wasp powered Fairchild. He used Cheminol AA fuel and a **6-3 TOP FLITE prop.**

1st place in the Class B Junior Free Flight event went to David Brownlee of Stone Mountain, Ga. His plane was a K & B 23 powered Spacer using home brew fuel and a **9-4 TOP FLITE prop.**

Bruno Markiewicz of Detroit took 1st place in the PAA Load Class AB Open. His plane was powered by a Torp 19 engine, fueled with Nitro X. The prop was a **9-4 TOP FLITE.**

Class ½A Scale Junior Winner Jim Watson of Fort Des Moines, Ia., used Thimble Drome fuel for his Wasp powered F. W. Stosser. His prop was a **6-3 TOP FLITE.**

Jimmie McCrosky of Iredell, Texas, won Flying Scale senior with a sleek F-51, powered by K & B 32 with Power Mist fuel. His prop was a **9-6 TOP FLITE.**

Taking the senior U.S. Navy Carrier event was the faithfully built Grumman AF2-S Guardian flown by Dave Domizi of Rocky River, Ohio. Dave used a Fox 35 engine with Cheminol XL-2, and a **9-7 TOP FLITE prop.**

The helicopter event was won for the second straight year by "Par" Schoenky of Kirkwood, Mo. He used Atwood .049 and O.K. .14 engines with Cheminol AA fuel, **6-3 and 9-4 TOP FLITE props.** At left is TOP FLITE'S Carl Goldberg.

Another Spacer flown by Robert Gelvin of Topeka, Kans., took first in the Free Flight Class A Senior. Bob's K & B Torp 19 engine was fueled with K & B 1000. The prop was a **10-3½ TOP FLITE.**

Both Class B senior and ROW senior were won by Sacramento's Bob Cherny. The Class B Whozat had a K & B 23 engine, using Ohlsson Gold Seal ½A fuel, and a **9-4 TOP FLITE prop.** Bob's ROW winning Lancer used a K & B 15, using the same fuel and an **8-4 TOP FLITE prop.**

27th Year of Publication

MODEL AIRPLANE NEWS

JAY P. CLEVELAND, President and Publisher

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CONTENTS

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Printed in U.S.A.

by William Winter

▶ Ted Martin's fine review of the O & R .049 Midjet in this issue points up the terrific rivalry in the Half-A engine field. Engine design was supposed to reach its zenith before Cox came along with the radical Space Bug. In last month's review, the exciting new McCoy .049's had the limelight. Now O & R proves that no one really knows how far engine design can go. This is truly inspiring. Quality and performance in the small engine field has far surpassed the consumer's demands. In MAN at Work's humble opinion, the example to the rest of the industry set by the engine makers could very well be pondered. To be sure, there are fine kits, products that rank as high against their kind of competition as do the new Half-A engines in their field. But are kits as a whole as far advanced as engines?

* * *

▶ Speaking of engines, Pete Chinn's lead article, Take Care of That Engine, is "must" reading. Smart dealers would do well to recommend it to their new engine customers, especially the small fry. Neighborhood kids, who bring us their engines with the story that the motors don't run, long ago shocked us into realizing what a problem manufacturers have with curious customers.

Now we all know—or should know—that an engine should never be taken apart needlessly, particularly after it once has been run. Have seen a Cub, fins gashed from a slip joint pliers, cylinder cross-threaded to the case, mounted like the Leaning Tower of Pisa; Torps with the liners in backward, heads on backward, with broken pieces of the baffle rattling around inside, homemade gaskets hanging out like untrimmed pie crust. Amazing, isn't it? But then we've seen boosters connected to the contrapiston lever on a Diesel, an Atwood Wasp mounted without a backplate, against plywood—and it started and ran! Reminds us of a remark Walt Good made to an old time radio expert—and we bet Walt forgot it. Said Walt, "Isn't that motor in loosely?" "Oh, no," said the man firmly. So he flipped the prop and the engine fell off. Now where were we?

* * *

▶ How long before someone RC's a scale ducted fan? It was Tom Purcell who kicked off the ducted fan movement in the model field with his early articles and Sabre plan in MAN. DeVault's recent articles showed refinements, especially in his canned duct. DeVault now says he has enough thrust to make the free flight overpowered. *(Continued on page 6)*

NEXT MONTH'S COVER
Boeing F4B-4

PLANE ON THE COVER

Undoubtedly, the best known and the most glamorous of any American fighter series was the Curtiss Hawk. Early models powered by Curtiss D-12 engine of 450 hp had a top speed of 170 mph. Span was 31-1/2 ft.; gross weight, a mere 2,802 lb.! Used by all services in quantity, it seems like a lightplane after a quarter century.

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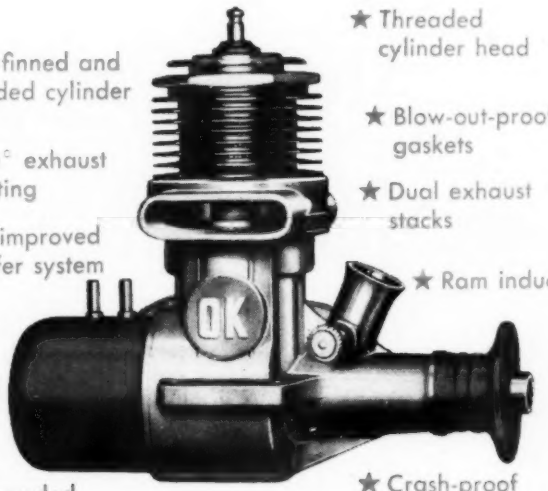

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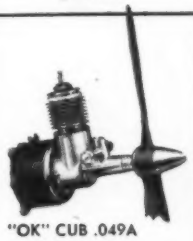

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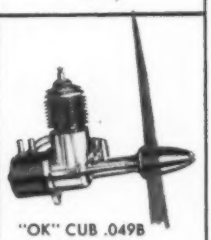

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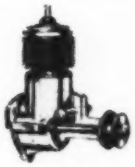

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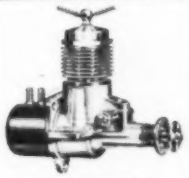

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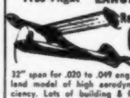

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MAN at Work

(Continued from page 2)

Here we go again! In fact, he shows that controlline is feasible. For RC you'd have to hold down the weight of equipment and that is all that's to it. Maybe a little hard to find room, what the crate hollowed out for the wind to whistle through. Incidentally, that MIG-15 jet in this issue was well worth waiting for. Paxton, the author, has made at least eight MIGs that we know of. No better recommendation. Scaled up and powered by one of the high speed .19's, it should make a good remote control deal.

▶ Never argue about religion, politics or the best size engine for stunt controlline. When it comes to Half-A especially, people are trigger happy. Some guys say the little engine jobs are best for kids to learn on. Cheap, small. With those new .049's, they should fly okay. Probably like any other type of flying machine, you can't load them down, or they slough off on the downwind side of the circle, especially with a tired engine not properly adjusted. The experts argue that you need a .29. Take-offs and landings not a problem even in tall grass. We've seen Lew Andrews do the full pattern with an .049 Barnstormer and with effortless ease. But the crate was light. Because the argument will go on as long as U-control is flown, would welcome your reaction to the middle of the road .09 Coquette, plans inside, designed by Dick Carlson, Des Plaines, Ill. Dick is an experienced stunt hand. Took Plymouth Regionals, Omaha, 1950; first stunt and scale, Sioux City, Ia., 1951; first stunt, Council Bluffs, Omaha, 1950-51; first stunt Nebraska States Meets, Lincoln, Neb., 1949-50. Looking at it from outside the circle, he has been a judge, too.

Having touched upon two of the three featured construction projects, might just as well round things out by telling free flighters that Fifinella, the .15-powered job by Bob Larsh, may look different from them there pylons, but don't let that fool you. Not only does this job have winning ways, but to any old timer it bears a welcome resemblance to those wonderful pre-war Taibi designs, like the Pacer, Brooklyn Dodger, et al. Sal used to make his crates out of oversized soft wood. He'd dope the entire frame before covering, or was it cement he used to rub on the longerons?

▶ Perhaps unique in the model plane field is MAN's contention that model builders want to read. After all, you see your favorite magazine only once a month, so it should stick to your ribs. With authors jabbering away on all sides lately, MAN at Work will now resume contemplation of beat-up maneuvers to pull next week-end with the Babcock three-channel. Results you'll hear about after deBolt presents his Schmidt job next month—and that isn't a kit, Eureka! Get to 'em all, one by one. So before going, we want you to dash out to your corner hobby shop, as they say on radio and TV, and inspect these two new kits, samples now on desk. One is the Civy Boy 61, a Gilliam design (of course), kitted by Kenhi and worked up by friend Joe Wagner. It's a grand kit, with a new method for simply alining a bulkheaded fuselage. Gilliam and Harry English put seven fuselages together, without pylons, in two hours. You free flighters who groan about being pushed around have special reason to encourage a daring venture like this one. And have a decent crate.

The other, and it's another topper, is Guillow's Trixy. One of the family put this together, without covering, in one hour. Prefabrication is much like Walker's Firecat, which wowed us some months back. Lew Andrews' Trixy design has the looks, and it goes without saying that it stunts like the devil. Both kits are lavishly illustrated with pertinent photographs showing step-by-step construction, an excellent addition to any kit plan.

Kenhi sample are our favorites. Someone wraps them in balsa slabs for protection. Protection, we love it. END

Flash News

Many developments push back the air frontier — this monthly report will keep you in the know.

▼

By JOHN F. RUDY

A powerful new push to get teen-agers wrapped up in aviation gets going shortly by all 2,700 Junior Chambers of Commerce in the U. S. Aviation Incentive Movement—or AIM, as it will be called—will be four-phased: 1) to get youngsters building solid type plane models, lead on from that to more advanced activity; 2) stage competitions for those 12 to 16 involving both flying and non-flying models; 3) take winners of second phase and pit them against one another in building full-size gliders or power models; 4) award scholarships for flight and technical training to winners of the third phase.

A final sobering note. The world of tomorrow in aviation depends so much on the world of today. The men who make all these fascinating developments possible are in short supply. Population is doubling every 50 years, but the need for skilled workers doubles every 20. American scientists no longer underrate the Reds. In aviation, according to intelligence sources, Russia graduates two specialists to every one in the U. S. But American industry is speeding its help—aviation manufacturers are sponsoring thousands of scholarships, giving financial help to employes studying engineering on a part-time basis, taking on top ranking high school grads on a 30-hour week, if they study on the side.

Air Force manpower problems are not getting any better, either. Airmen leave the service at a yearly rate of 60 per cent at the end of the first four-year hitch. One brass-hat describes it as a frog on ice: "Every leap forward, he slips back two." AF is now just about 20,000 men short. Training costs average $15,000 for airmen. The increasing use of highly specialized equipment sends training costs soaring: $75,000 for an electronics expert, up to $608,000 for a B-47 pilot.

Army isn't talking much, yet, about its speeded 'copter training. But qualified enlisted men are allowed to start "chopper" training from scratch instead of taking conventional work first. Idea is to expand the present seven whirlybird companies to 36 in the next four years. This would give Army about 700 cargo 'copters able to lift around 14,000 fully equipped troops or the equivalent materiel tonnage. But a big problem is off on the horizon—after a three year hitch a 'copter pilot gets the noncom rank of warrant officer. This isn't too high, if industry has lucrative openings.

Our Foreign Aviation Friends Department: Britain will try to improve her bombers by new devices, rather than bring a lot of new planes into production. Most affected will be the Vickers *Valiant,* Avro *Vulcan,* Handley Page *Victor.* Aerial refueling kits, for example, quickly converts the planes into tankers. A new rocket kit facilitates faster take-offs, thus smaller fields.

West Germany waited only a few days after sovereignty to fly her first domestic plane, the *Moraa.* First unit is a converted glider fitted with a Volkswagen 30 hp engine. The two-seater will fly up to 62 mph, down to 31. Sales price may be around $2,500.

France has a new farming plane. It's made specially for overseas areas to control forest parasites, malaria breeding mosquitoes. Dimensions: 33 ft. wingspan, 161 hp motor, 80 mph cruising speed, can slow to 24, land and take off at 33 and 76 yards, respectively. Cost: about $2,500.

Ancient ideas in aviation sometimes return. Such is the flapping wing. A new one invented by a German technician will be wind-tunnel tested by the French. Wing has a thick leading and thin trailing edge, shaped like the wing of a buzzard. A prototype glider, it will carry one man. Wing flapping commences via a 1 hp motor. When man and wing are airborne, flapping continues with foot pedals and a hand-operated lever.

The airlines, with the help of builders, really mean to capture the passenger traffic market. TWA, with Lockheed building it, will try to shrink the globe in 1957 with a turbo-compound Super Constellation. The 6,500 mile range will mean New York to Rome non-stop, Tokyo to Honolulu, Buenos Aires to Capetown. Pan Am and Eastern both have DC-7B's which, with saddle tanks, will have a non-stop range of 5,120 miles, top speed of 410 mph. Then, American Airlines will have (in 1958-59) about 35 of the new Lockheed turbo prop planes. But who will operate the new atomic-powered plane a few years hence?

The problems of jets, they have the experts saying . . . well, "darn it" is a good expression. How to stop a fast plane on a runway is getting to be quite a problem. Typical landing speeds used to be about 30 to 40 per cent of top speed. *(Continued on page 49)*

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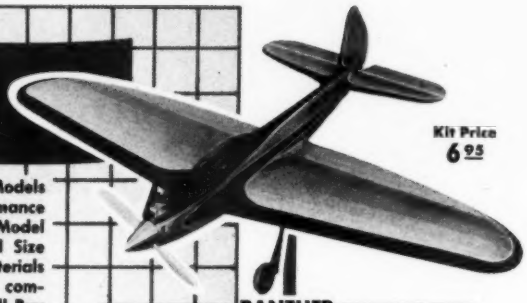

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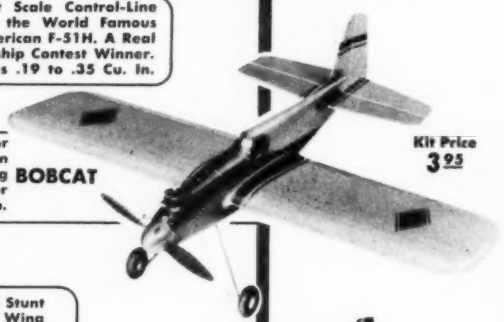

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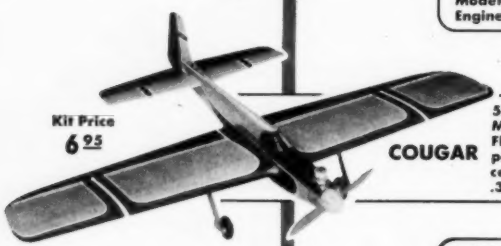

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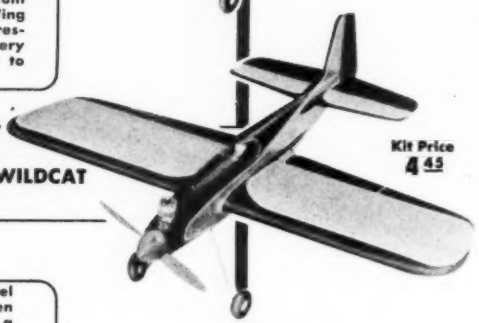

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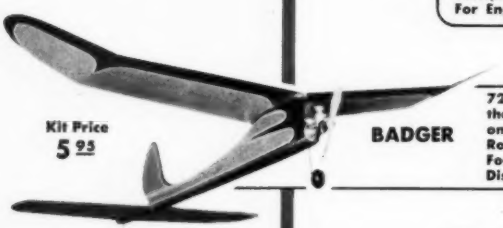

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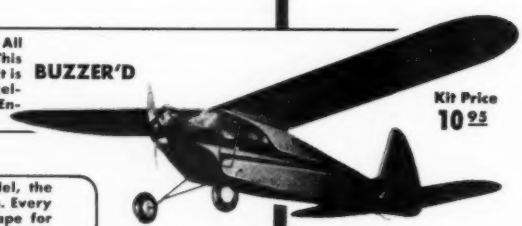

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Take Care of That Engine

By P. G. F. CHINN

Like this high revving Cub Diesel, new engines really put out. How long they do so depends on you.

If dirt forces disassembly, soak parts in jar of kerosine. Scrub dirt off with a toothbrush.

You—put down that monkey wrench! Put away those gas pliers! If you must, absolutely must, take apart your engine, do it the proper way. More engines ruined on a bench than in use.

Always use the proper tools. Top row shows samples manufacturer-supplied wrenches. Below, magneto spanners, Phillips screwdriver.

When grandpappy bought his first automobile, he also got a book on how to "prepare to operate" it ("The motor should now start," it said, around page 50) and he sallied forth armed with two spare tires, three tubes, four spark plugs and an ambitious kit of tools and spare parts. Today, reliability is so much taken for granted that half the population runs around without even knowing how many cylinders are under the hood. Model engines, too, have attained this wonderful reliability.

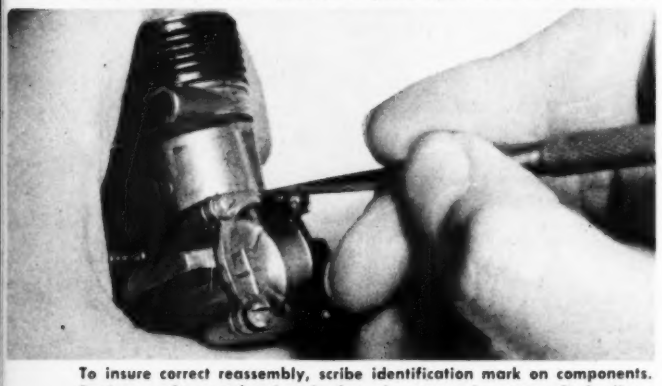
Even so, reliability is no excuse for neglect or incorrect handling. In the modern model motor, manufacturing tolerances are held to within close limits and the superior selection and treatment of materials used in their construction have given us rugged little power units, which have far greater life than the early jobs—provided we do not ill-treat them.

The vast majority of American model engines are of the glow plug type, which cuts out all the numerous little faults that used to plague the pioneer gas modeler. The glow plug needs only a 1-1/2 volt supply for starting. The usual battery employed is a couple of No. 6 dry cells connected in *parallel*. All American glow plugs operate on 1-1/2 volts. They *can* take slightly more: around 1.75, or even up to a maximum of 2 volts, although this latter figure is not recommended as it will reduce the life of the plug and will not necessarily make starting any easier. Note this well. Some plugs, generally those of the short reach "Half-A" type, glow very brightly on a normal voltage and these hotter plugs may also be used in low-compression engines, or for improved winter starting, but applying an excessive voltage to any plug may fire the mixture prematurely and thus complicate starting.

The only exception to the 1-1/2-2 volt rule concerns some foreign plugs, in particular those fitted to some Japanese en-

Never, never take apart engine unless compelled to. To begin disassembly, slack off all screws. Imperative to use right size screwdriver.

Remove head screws next. If the cylinder head is stuck, rotate it as shown here. This sequence of pictures is based upon the K & B Allyn .15.



To insure correct reassembly, scribe identification mark on components. Beginners often get head on backward, or wrongly rotate cylinder liner.

Hold crankpin at the bottom of the stroke, then rotate cylinder and carefully withdraw. Note that exhaust; intake ports differ in positions.

Push out wrist pin, remove piston. Then disconnect rod and withdraw shaft. Procedure may vary because of differences between engine designs.

gines, including certain types in the OS range, Enya and Fuji models, which need a full 2 volt supply, preferably from a fully charged storage battery cell giving 2.15-2.2 volts. The British K.L.G. Miniglow plug, however, which is sometimes erroneously rated as a 2 volt plug, is, in fact, overloaded at this voltage and the makers recommend the use of a simple resistance to keep the applied voltage down to about 1.75 when using a 2 volt storage battery.

When your plug is glowing properly, the element should normally be a bright red or orange. The hotter types of plug glow more brightly, as we have said. Therefore, take notice of the color of your filament when operating on the maker's recommended voltage and use this as a check on future occasions. If the element is only a dull red, or if the glow dims when you hold the leads connected for 20 or 30 seconds, your battery is too low. When using a 2 volt cell, the easiest method of cutting the applied voltage is to use the resistance of long plug leads. Adjust length to obtain required glow.

When removing or refitting a glow plug in a screw-in type head or cylinder, incidentally, use a wrench to hold the head or cylinder. Some manufacturers provide special wrenches for this purpose.

Fuel is important, too. Use the mixture the makers recommend. Most glow motors will run on different brands of fuel, but may not be so easy to start and/or may have lower performance if a fuel other than the specified blend is used. If, however, you are located in a quarter where an appropriate commercial fuel cannot be obtained, you can safely use a standard mixture of 50 per cent methanol, 30 per cent castor oil and 20 per cent nitro-methane.

During the past three years, Diesel, or miniature compression-ignition, engines have come on the market. Both the McCoy and OK Cub Diesels are very good and compare more than favorably with the best imported model Diesels of similar displacement, of which there are now many available. Modelers acquainted with only glow plug engine characteristics may, however, find at first these motors do not appear to be so easy to operate. Actually, when one understands the essential differences between glow plug and Diesel handling, and has acquired that adroitness which distinguishes the experienced Diesel operator, these motors are very easy to handle.

Your Diesel will run a bit "harder" than an equivalent displacement glow plug motor. It will need a more vigorous flick of the prop. Therefore, mount it firmly on the bench. Use a prop of the diameter and pitch recommended and, if the manufacturer lists both free flight and controlline props, use, preferably, the bigger diameter free flight prop: it will have the better "flywheel action" that is an aid to starting.

Mount the prop so that it is horizontal when gently brought up against compression. Fill tank and open needle valve to required setting. Set compression as recommended. Choke intake and turn prop until fuel is seen to pass through fuel tube and reach jet, then give two more choked flicks to get the mixture into the crankcase.

On the McCoy Diesel, we found it best to prime through the exhaust ports with a few drops of fuel, as on a glow plug motor. With the Cub, this is not essential: two extra choked flicks of the prop to induce a rich mixture into the combustion

Some types of gaskets become bonded to metal through heat. Scrape off. Be sure to remove every speck of matter but not score the metal itself.

chamber can be adopted instead. On average, the motors appear to have about the same over-all starting time.

When flipping the prop to start, it is essential to give a sharp flick with a Diesel. The most rapid flick is obtained by positioning the finger near the hub of the prop and flicking it vigorously around and over top dead center.

The best performance with a Diesel comes with a fairly high compression setting and a weak needle setting. If compression is too high, however, the motor will begin to labor and slow up. As the motor warms up, too, it is necessary to compensate the advanced ignition point by slackening compression slightly. If compression is too low, the motor will misfire.

The needle should be turned down slowly until the motor starts to miss, then opened up slightly to the smoothest running position. Generally speaking, Diesel needle valves require much less attention than glow plug motors. Once the optimum setting has been found, it is often possible to leave the needle almost permanently at that setting for both starting and running.

There are several good Diesel fuel blends now on the market, but, if you should have to mix your own, remember that most modern high-speed model Diesels require a somewhat higher ether content in the fuel. The ether helps to keep the engine cool and not less than 30 per cent should normally be present in the fuel. Most Diesel mixtures now contain certain additives which improve the octane number rating of the fuel. In this way, they lower the compression ratio necessary to achieve self-ignition and also smooth combustion considerably. The most commonly used additives are amyl-nitrate and amyl-nitrite. About two per cent is normally used.

With some Diesels there is mechanical limitation on the compression ratio that can be used. Some designs (e.g., the Mills) employ a pin in the cylinder head which restricts movement of the compression-screw. The Cub has a special flanged contra-piston which can move only a limited way down the bore. High prop speeds require increased compression suitably to advance the ignition point. Thus, with the Cub, a nitrated fuel mix is essential for speeds above, say, 11,000 rpm. Any attempt to run the Cub at a high speed on an inferior fuel will merely result in the motor's misfiring, even though the compression be increased to the limit.

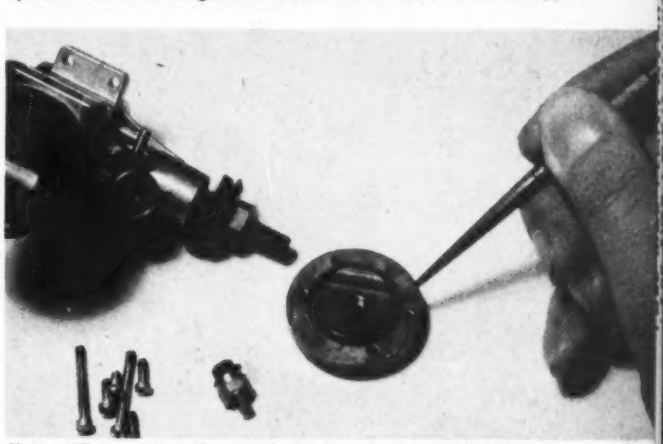
Needless to say, fuels, both Diesel and glow, should always be clean. Filtering is advised. Modelers are frequently recommended to drain out fuel from the engine and tank after use. We will repeat the advice and add a warning that some Diesel fuels have a bad habit of coagulating inside a motor if left for a long time. If this happens, the motor will have to be stripped and washed in gasoline to clear out the jellified substance blocking ports and passages.

Difficult starting is seldom attributable to a mechanical fault in a new motor. Sometimes, however, with glow plug motors using gaskets to seal head joints, the gasket will "blow" and there will be a loss of compression that will make the motor impossible to start. Sometimes a leak or blown gasket results from irregular tightening of head screws. Always, when reassembling any part, tighten securing screws progressively. When fitting a head, for example, run down the screws as evenly as you can during the *(Continued on page 42)*

Below—When cleaned, lay out parts on white paper, oil during reassembly, use new gaskets. Keep open ports plugged with cloth after assembly.

When tightening glow plug on screw-in type of cylinder, hold head with suitable wrench as on Cub .049B. Careless work easily distorts engines.

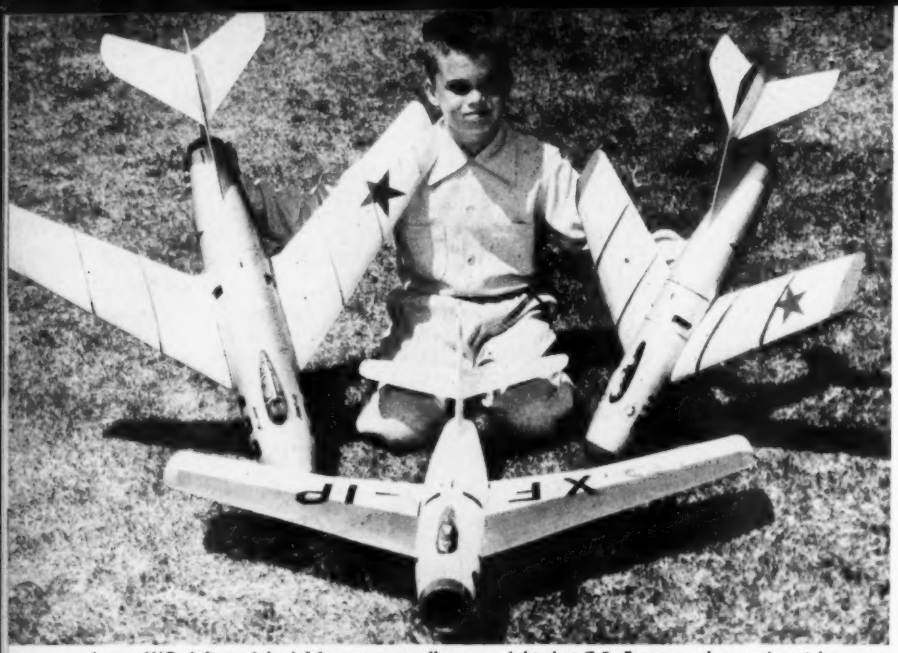
Important to hold cylinder when tightening head and use correct tool if cylinder is removed or tightened. Note wrenches used on Thermal Hopper.



Motor will never start if gasket leaks. Look for damaged gasket. Loose back plate also causes poor starting. Tiny gasket break causes trouble.

When tightening head, run down all screws, back off half turn, then tighten diametrically, a few degrees at a time. This is a Torp .35 motor.

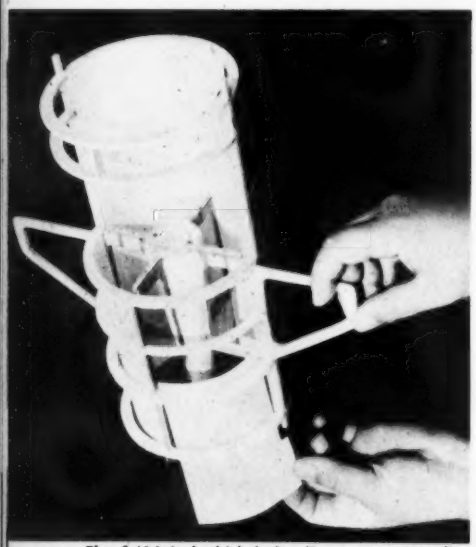
The MIG 15



Large MIG, left, weighed 14 ounces; smaller one, right, but 7.5. Foreground, experiment in areas.

By W. H. PAXTON, JR.

Practically a squadron of these little MIGs was built before the author turned loose this splendid flying, ducted fan .049 job.



The 1/64 inch thick balsa liners are cut to fit, sanded smooth as shown, cemented in position.

Nose, aft, sections lined Art Paper. With mid-body, one sealer, three fuelproof dope coats.

This model of a Russian MIG-15 (captured by America at the end of the Korean War) is powered by a standard Wasp .049 engine driving a metal fan giving sufficient thrust to produce a nice rate of climb. It will provide the most realistic flights you've ever seen.

Construction is amazingly simple as a result of several years' study and building of nine versions of this airplane, incorporating improvements and simplifications as developed. For instance, the mid-body bulkheads can all be cut by jig saw at the same time and planking the double-contoured fuselage is held to a minimum by using sheet balsa covering on the mid-body.

Step-by-step construction details follow: Drill holes in tin strip to match mounting holes in Wasp engine fuel tank and solder on 3-48 nuts. Cut out Minus-2, Minus-3 and Minus-4 mounts from 1/8" basswood plywood. File or sand front edges on Minus-3 and Minus-4, as noted on drawing. Cement Minus-2, Minus-3 and Minus-4 mounts together after locating plate nuts to holes in Minus-2 mount. Use Ambroid or other fuelproof cement and tie with thread as noted.

Add 1/16" square strips and cover aft portion of cone with Art Paper. Form forward cone of Art Paper and cement in place. Give complete assembly one coat of sealer and three coats of hot fuelproof dope.

Bulkhead rings are next cut out of 1/16" or 1/8" balsa or basswood plywood, as specified on the drawing. Stringers are then cut from 1/8" balsa sheet or 1/8" x 1/4" balsa. The basic mid-body portion is then assembled by keying-in parts, as noted in the isometric view on the drawing.

Drill holes in hatch members for latch pins and locating side pins and then cut through Minus-26 at front and rear of hatch, which can then be removed. Mid-body is then lined with 1/64" balsa, as

Mid-body covered with 1/32 inch sheet balsa. Nose and aft sections are planked with 1/16 x 1/4 balsa strips, side by side, cemented, pinned, as is shown here. When sanded smooth, it looks real good.

shown in photograph. Nose and aft sections are then assembled and are then lined with Art Paper, trimming to fit. Inside lining of nose, mid-body and aft sections are then given one coat of sealer and three coats of hot fuelproof dope.

Assemble tail cone as shown on drawing. Give sealer and dope coats as above. followed by one coat of hot fuelproof dope. Cut out thrust deflector from soft .020 aluminum and install in aft section along with tail cone assembly. Use Ambroid cement or equivalent. Nose and aft sections may then be cemented to mid-body, taking care to obtain correct alinement. Clothespins may be used to advantage here while cement is drying.

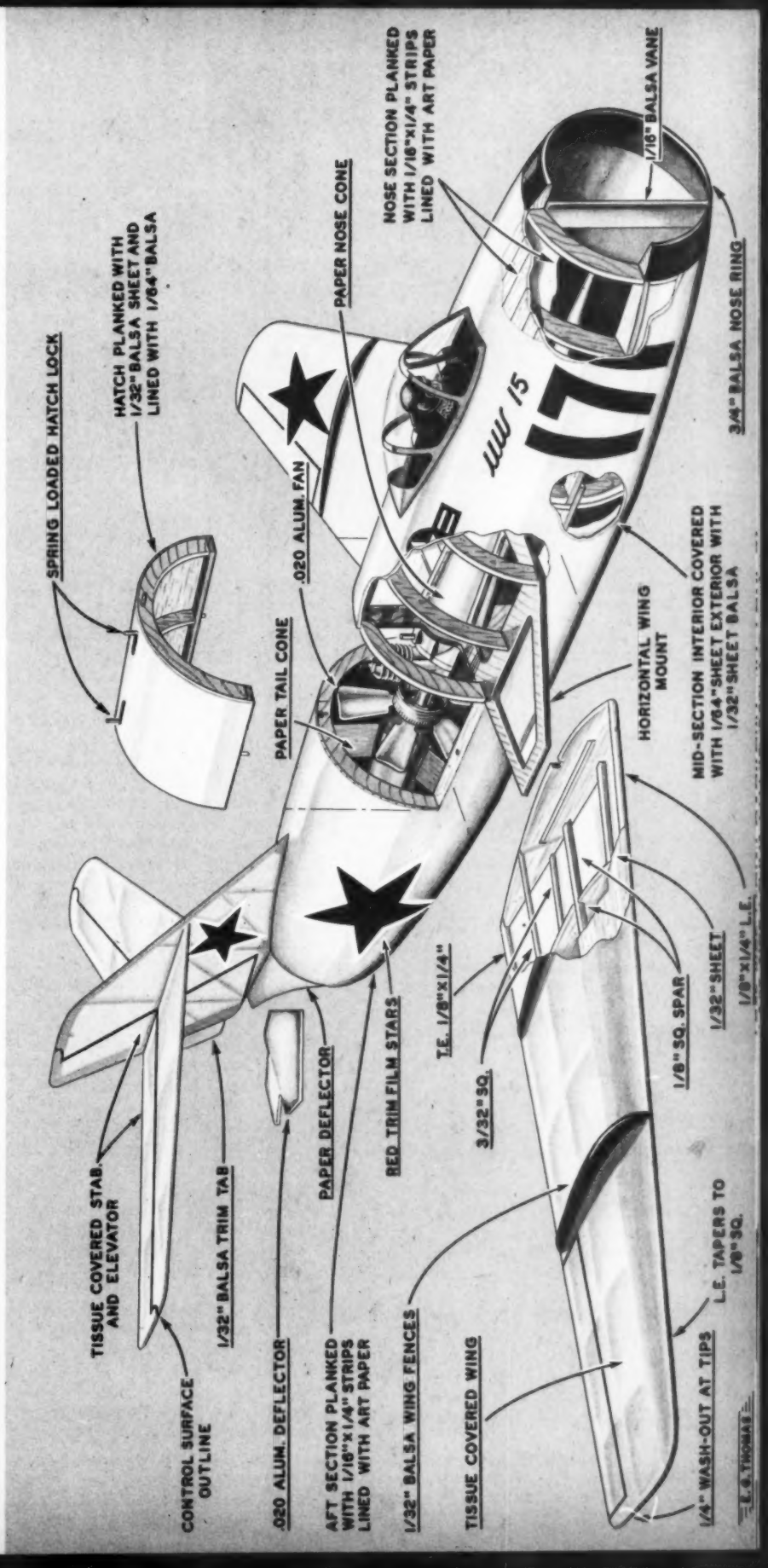
The mid-body is next covered with 1/32" balsa sheet and nose and aft sections are planked with 1/16" x 1/4" strips, as shown in photograph. Always start planking by having first joint between two adjacent pieces fall along horizontal or vertical center lines. This will later be of great assistance in alining rudder, wings and cockpit canopy.

The nose block is then cut from a 3/4" soft pine block and cemented in place. Fuselage is sanded down with gradually decreasing grades of sandpaper with a final sanding of 320 grit paper. Exterior is then given one coat of sealer, two coats of nitrate dope and one coat of clear hot fuelproof dope.

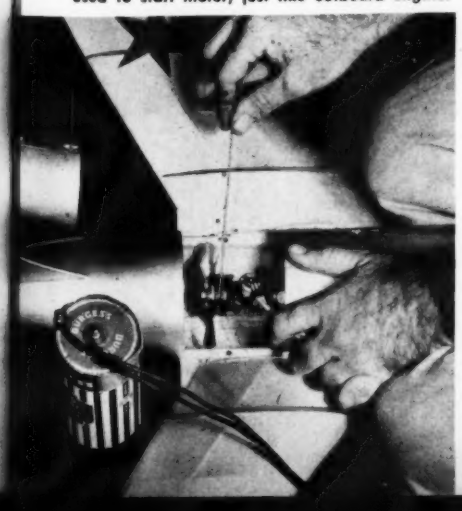
Hatch assembly is next completed from details on drawing and sealed and doped inside and out, same as mid-body. Springs for latch mechanism are wound from a guitar "E" string which can be purchased at any music store.

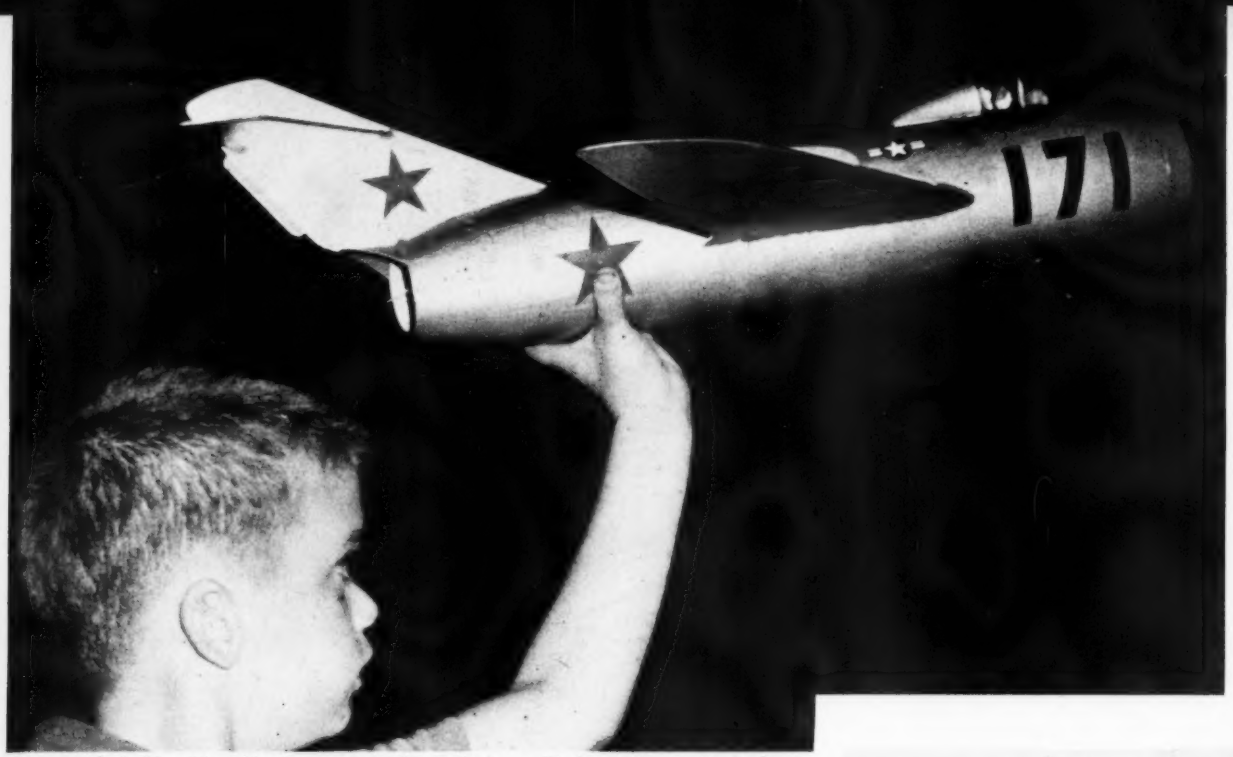
The rudder is next assembled directly on the plans, using soft balsa as specified. Parts as noted on the drawing are not assembled on the plans but are added at the time the rudder is cemented in place on the fuselage. After cementing to the fuselage, rudder and trim tab are covered with Japanese tissue and water-sprayed. This is followed by two coats of nitrate

(CONTINUED ON NEXT TWO PAGES)



Piece of string wrapped around a bottle cap is used to start motor, just like outboard engine.





Proper method of hand-launching is demonstrated by author's son. Wash-out at tips is clearly shown.

The MIG-15

(Continued from page 13)

dope and one coat of clear hot fuelproof dope. To avoid warps, do not cut out tissue for stabilizer until after final coat of dope has dried.

Stabilizer is next assembled directly on the drawing, covered with Japanese tissue, doped same as rudder and cemented in place on rudder. Wing ribs are next cut out by tracing through plans with carbon paper to balsa wood, taking care to obtain accurate location of slots in first two ribs which position the wings to the body and establish the amount of dihedral.

Right-hand wing can then be assembled directly on the plans. Use template for setting angle of rib A. Right-hand wing must then be traced on tissue or transparent drawing paper and turned over for assembly of left-hand wing. Leading edges are covered with 1/32" sheet balsa and complete assembly sanded smooth. Wings are then slipped onto fuselage wing mounts and cemented into place after careful check of alinement.

Usually, you will find that this type of wing automatically warps into about a 1/4" washout at the wing tip, which is desired. If not, a little steam will produce this washout, following which the wings are covered with Japanese tissue and doped, as were the rudder and stabilizer.

The complete airplane is then given a single coat of Aero Gloss Silvaire aluminum, sprayed on if possible. Red and black trim and decals are then added as noted. Wing fences are cut from 1/32" balsa painted red and then cemented to wing ribs as shown. The cockpit canopy may be purchased at any hobby shop and silver strips added as shown. Area under cockpit is painted dull black. Pilot and accessories are carved from balsa and painted to suit. Canopy is cemented in place with Ambroid.

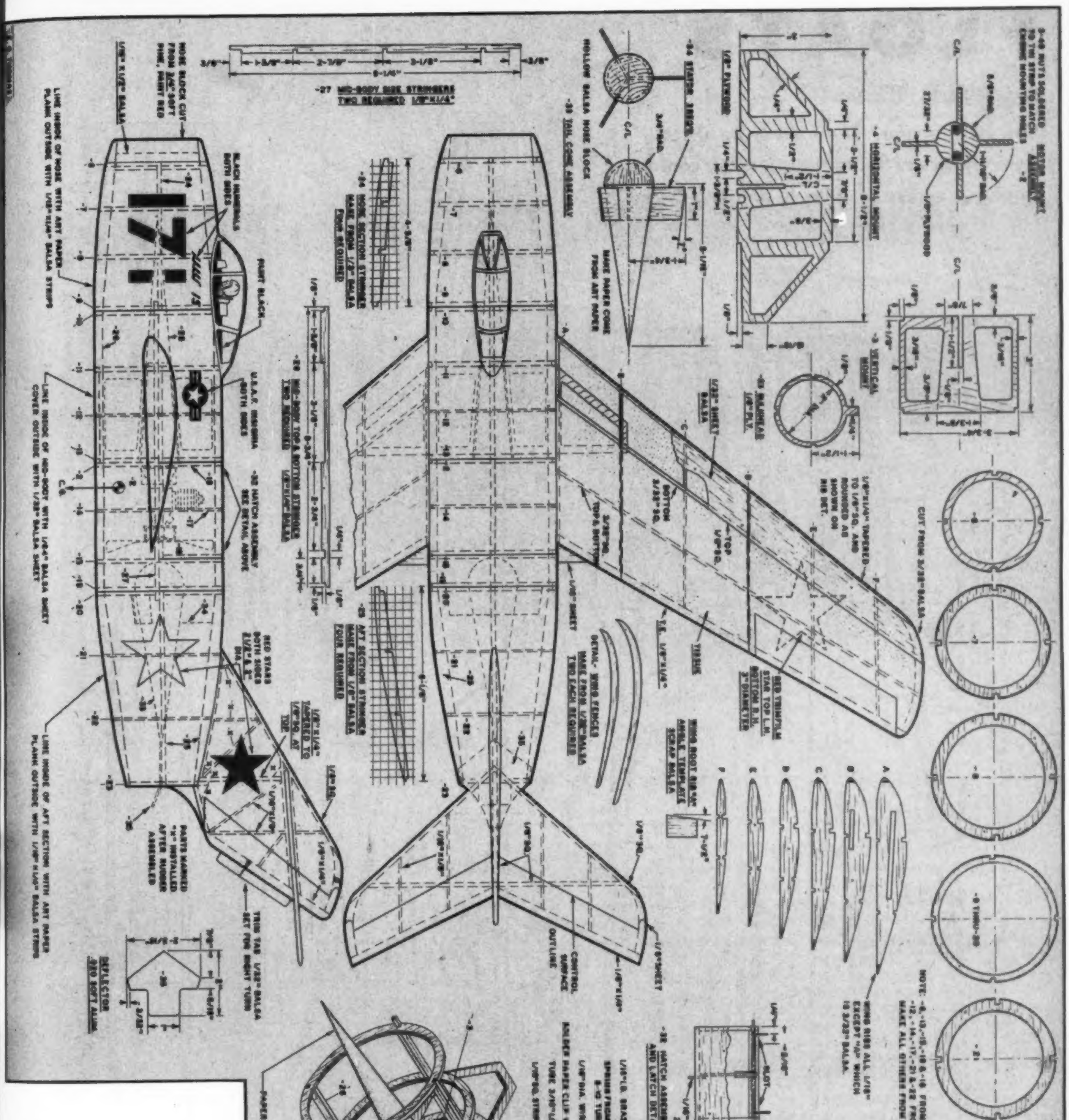
Metal fan is cut from .020 aluminum. Blade angles may vary slightly from those shown, but should be as consistent as possible on all six blades. Drill hole through center of bottle cap to match propeller shaft and install engine and fan.

Airplane is now complete and, if proper selection of wood and care in building have been observed, it should weigh less than 8 oz. with engine and fan installed. Stabilized angle should be correct as shown and model should balance at CG point noted.

Trial glide and first flights should be made in tall grass. Clay may be used at nose or tail to provide proper glide angle. Obtain long smooth glide before attempting any power flights. Starting engine is accomplished with string wrapped around bottle cap, as noted in photograph. Glide and flying speed are fast, as is to be expected on this type of airplane. Tail deflector should be set at about angle shown to prevent stall or loop on first flights. Gradually adjust deflector to give smooth climb, which will be followed by a long floating glide. Model shown climbed to the left and glided to the right. Happy flying!

Eighth model built with author, Bob Holland and George Casselberry of Holland Engine Co.

A good speed of 25-40 mph is attained as No. 117 buzzes the ground. Climbs like free flight.

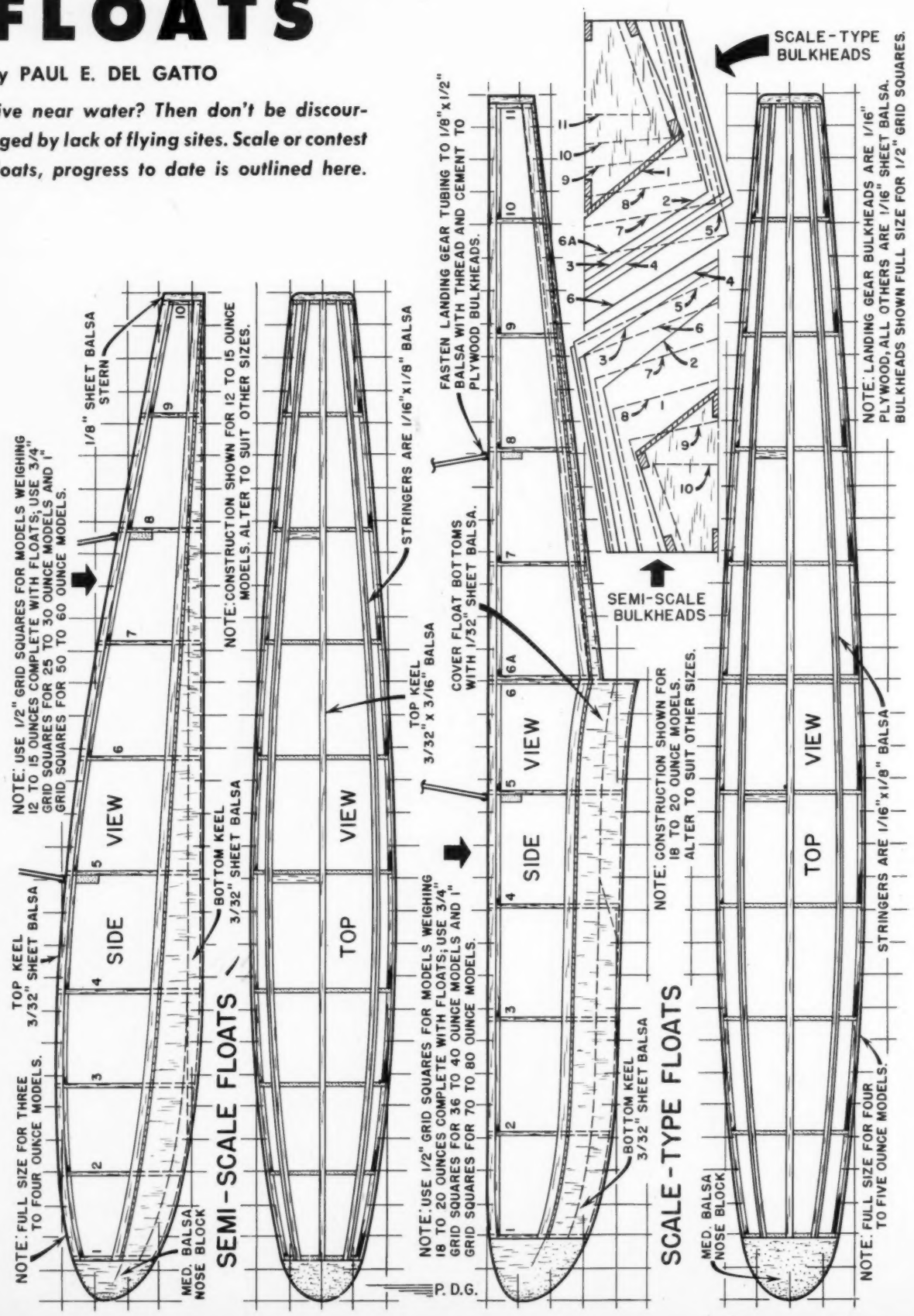


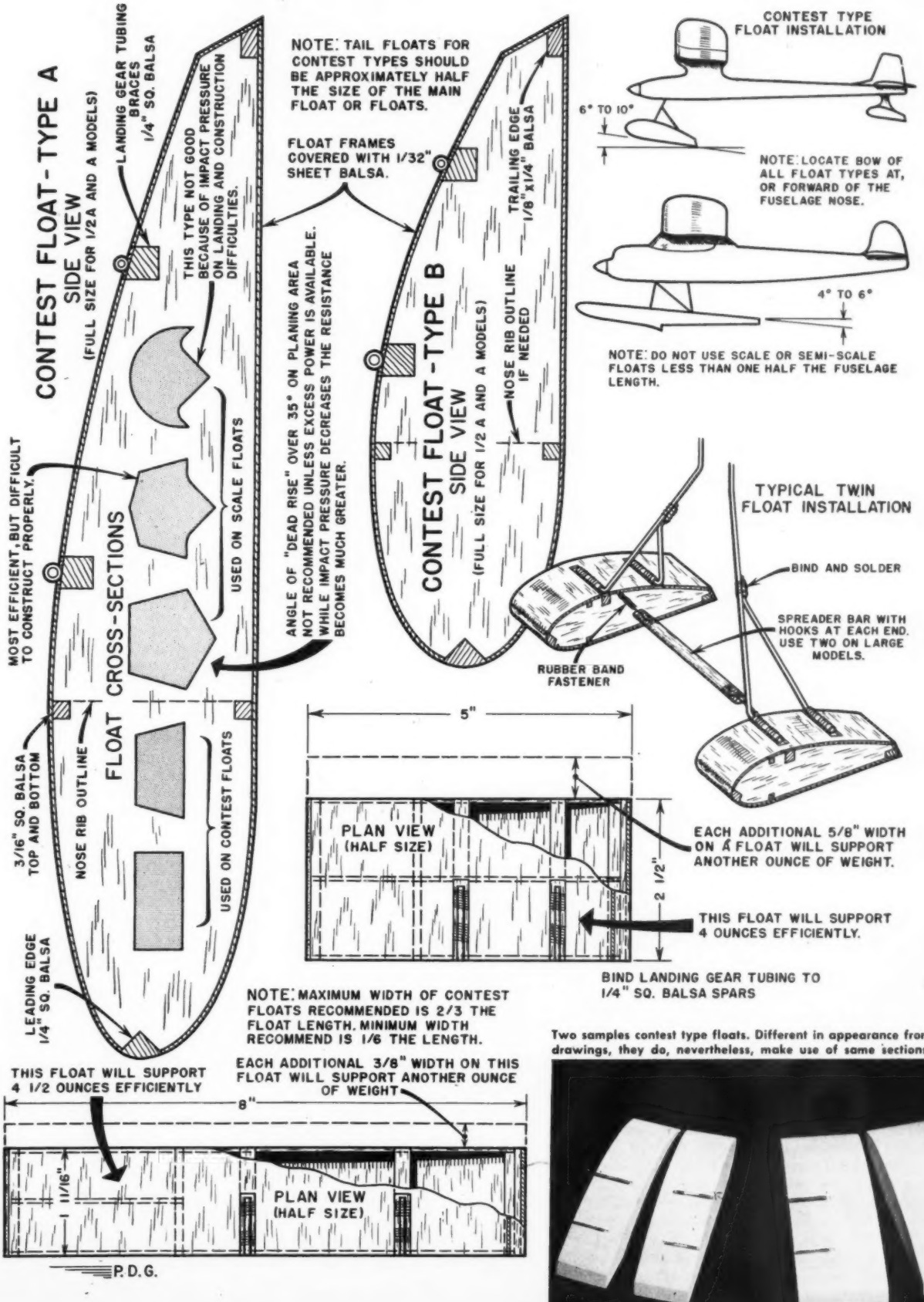
FULL SIZE PLANS AVAILABLE SEE PAGE 42

FLOATS

By PAUL E. DEL GATTO

Live near water? Then don't be discouraged by lack of flying sites. Scale or contest floats, progress to date is outlined here.





Two samples contest type floats. Different in appearance from drawings, they do, nevertheless, make use of same sections.

Fifinella

By BOB LARSH

A 2:50 average on 11-second run isn't bad and when you break three minutes ROG in .15 class, you are not doing badly either. Author cranks

Below—Never was anything easier, or better, than the crutch backbone for free flight body.

Sport job looks don't handicap this .15-powered FAI free flight. Easy to build, is rock steady in climb with smooth transition into the glide.

Fifinella was first conceived and built to meet FAI cross-section rules early in 1954. The ship was built and tested before the cross-section rules were abolished. The model performed so well that I entered it in the FAI Regionals against pylon models with no misgivings whatsoever.

Fifinella held her own and qualified for the Semi-Finals; however, two days before the Eliminations, she was lost on an early morning test flight and wasn't recovered until a month later. Since then, Fifinella has been flown in all the local contests and has always taken one of the first three places. At one meet, where all classes were combined, Fifinella took third against a strong field of "C" jobs, justifying her name which originated from folklore and means a mischievous female gremlin.

The model is not a true cabin type but actually is of the pylon category. It has small frontal area and a tapering fuselage with the cabin blending in, which gives pleasing lines—a relief from the conventional pylons.

Fifinella consistently averages 2:50 on an 11-second motor run and easily breaks three minutes on a 15-second motor run, ROG, and is rock steady on the climb with a nice transition to the glide.

Fuselage

Lay out the 1/2 x 1/4 in. crutch and add the 1/2 x 1/8 in. cross-pieces from the rear up to F_6. Let dry and lift from plan. Cement in bulkheads F_3 to F_6 and the 1/8 in. ply firewall F_2. Then cement on the backbone. The backbone is made from a 3/16 in. sheet with 1/16 and 3/32 in. tapered strips cemented to the top as indicated. This arrangement gives a smoother cover job. Add the 1/8 in. sheet supports F_7 to F_{14}. Use a short piece of 1/2 in. sq. for F_{15}. Add the 3/16 in. sheet bottom and taper the edges. Cement on the 1/4 in. sq. bottom longeron.

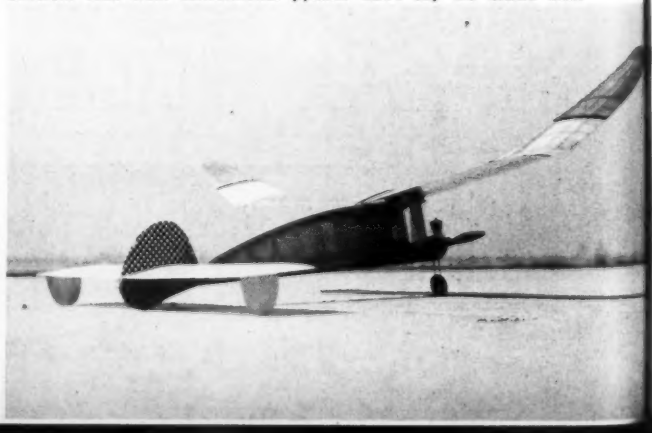
Cement the 1/4 in. sheet cabin top in place and taper sides to conform with bulkheads. Groove out cabin top to take the 1/8 x 1-1/4 x 3 in. plywood wing saddle. Install tank and add the 1/8 in. planking and the 1/16 in. sheet fill-ins. Cut out hole for timer and the outline for the cabin. Cement 1/16 in. sheet plywood braces to the inside rear of the crutch to take stress from tail twist. Groove rear of crutch to receive tail saddle made from 1/16 in. ply and 1/16 in. hard balsa cemented together.

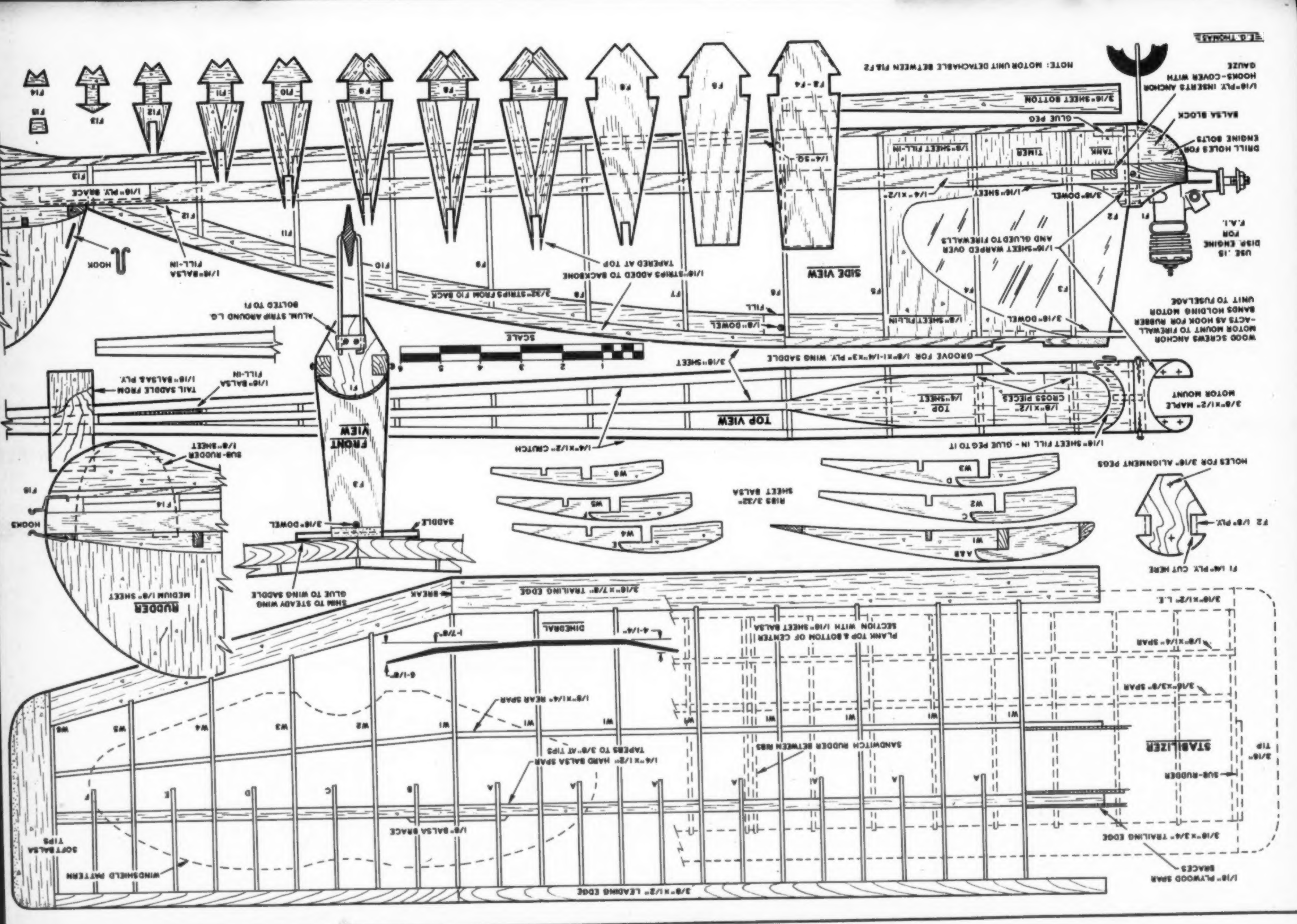
Next, cement in 1/16 in. ply inserts near front of crutch which anchors hooks to strap on engine unit. Gauze over the inserts. Add the tail hook and cement on the main 1/8 in. sheet sub-rudder. Put on windshield after the fuselage is covered. Cement in the hardwood dowels.

Wing

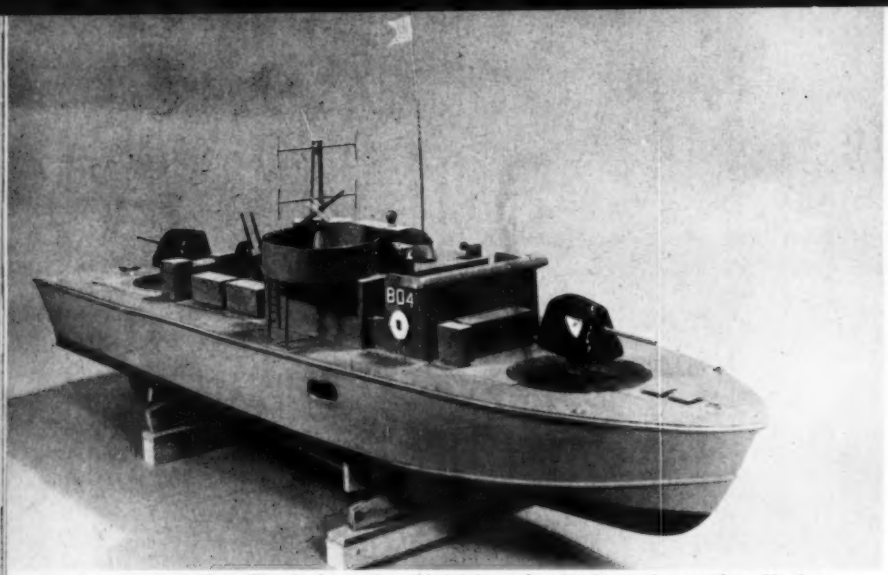
Lay out 3/8 x 1/2 in. leading and 3/16 x 7/8 in. notched trailing edges. Block up front of trailing edges with 1/20 in. pieces to receive the ribs properly. Next, cement in ribs and, when dry, lift wing and add the 1/2 x 1/4 in. and 1/4 x 1/8 in. spars. Cement in the false ribs and the polyhedral. Add soft balsa tips built up from two pieces of 1/2 in. sq. and cement in the dihedral braces. On the outer panel use balsa for dihedral braces. The reason is that this joint is strong enough for all normal loads, so when a particularly strong obstruction is encountered—or if the model ever cartwheels—the outer panels will merely knock off at the cement joints instead of shattering the whole wing. Plank the top and bottom of the center section with 1/16 in. sheet balsa. *(Continued on page 38)*

It may look like a cabin job but really is plyon, says Larsh, who valued a different look from conventional pylons. Can't say we blame him.





FULL SIZE PLANS AVAILABLE. SEE PAGE 42.



Boat may look like million bucks, as does this job by author, but beauty is more than skin deep.

Thinking of R C BOATS

By WILLIAM BECHER

While MAN is an airplane magazine, it is felt that RC'ers who dabble in boats as well deserve good information. This article is a special service.

Despite the widespread interest in RC boats, very little basic information is available on the subject. Most equipment manufacturers don't even mention boats in their instructions. The boat kits themselves generally stop with a wiring diagram and a simple "bang bang" rudder mechanism. The result is that the new skipper winds up with a maze of wires, a radio installation that works only sometimes and an impulse to scuttle the ship with all hands aboard. This article is an attempt to answer some of the questions of that budding skipper.

An RC boat makes one of the best possible test beds for RC equipment. There is very little risk of a screaming spiral dive's shattering weeks of work, not to mention the investment in money represented by an RC plane. Weight of equipment in a boat is a secondary consideration. Therefore, the number of separate functions that can be controlled are limited only by the modeler's ingenuity in thinking up new ones.

A good beginning point for model boating is a kit boat. But even with the best designed kit on the market, it will pay in the long run to take it very slow, both in the construction and in the installation. It is a heartbreaking experience to start stringing wire back to the rudder, only to discover that there is no provision for a hole through a plywood bulkhead up under a freshly varnished deck. For that reason it is best to study the plans before starting construction and visualize the locations of receiver, controls, batteries, wiring, linkages and rudder actuators.

One other point worth mentioning here is in connection with the boat itself. It pays to follow the plans very closely. For instance, don't make a change in size or shape of one of the parts in an early stage of construction. Unless you think it out carefully, you are likely to find that some of the parts to be built in later don't fit. If you do decide to make a change, be sure you know what you are doing.

Before you start building the hull, give a lot of thought to how the radio gear is to be installed. To be really shipshape, the installation should be neat, accessible, protected from the hazards of both spray and exhaust, removable for servicing and convenient to tune and check.

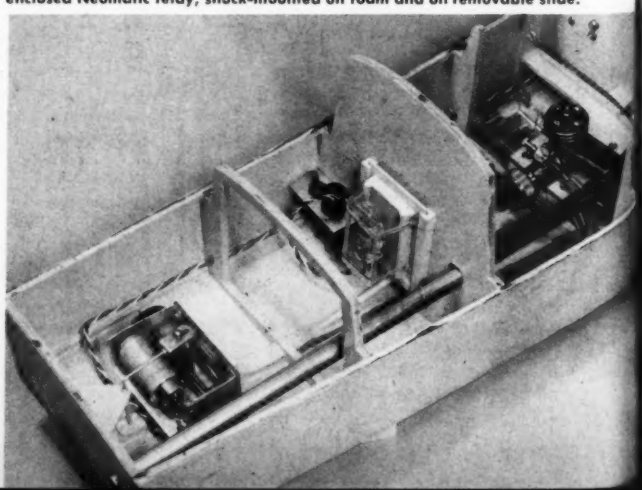
Taking the requirements one at a time, they stack up something like this. First is accessibility and it means just that. When you have to hold the cabin top or the meter in one hand and the tuning wand in the other, that doesn't leave many hands to turn over a chassis to tighten a lock nut on a tuning coil. Boats are best adjusted in the water with the motor running. When the time comes for those last minute adjustments, you want to be able to make them without standing the boat on its side or on its nose while you delve into its innards.

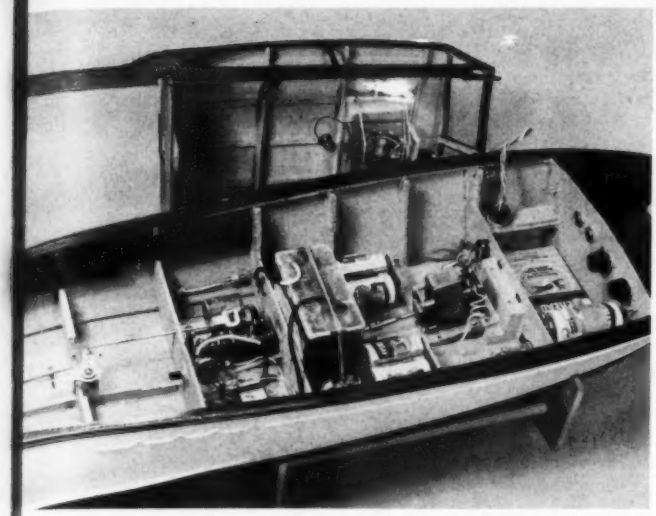
At pondside, you'll want to be able to check voltages under load without removing the batteries from the boat. Relays often need cleaning and adjusting, batteries have to be replaced, servos or escapements checked and adjusted. Everything that needs cleaning, adjustment or replacement should be as readily accessible when the boat is in the water as it is when the receiver is on the test bench.

Equipment should be protected from the hazards of exhaust, dirt and, most important, water and water vapor. Water and radio frequency just don't mix. Often just a fine spray of vapor striking the receiver is enough to put it out of action without a clue to the trouble. The solution here is simple. If you build your own receivers, build them in small plastic cases. These are available in many forms: in hardware stores and hobby shops as spare parts boxes; plastic cigarette cases that take the whole package are another source. If you look through the stores, you can probably turn up something that will do very nicely.

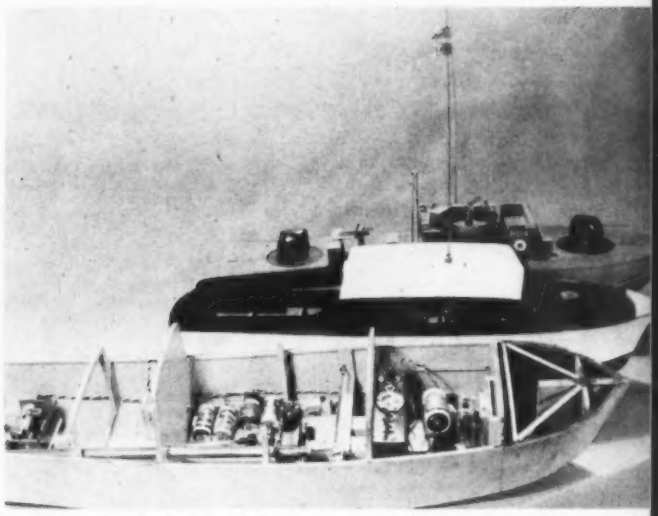
Antenas and power cables can be run through rubber grommets and sealed with liquid rubber or auto weatherstripping cement. The receiver case itself can be sealed with a strip of Scotch

Stern section showing proportionate actuator made from Distler motor; enclosed Neomatic relay, shock-mounted on foam and on removable slide.





Interesting amidship view pleasure craft showing Pittman electric motor, battery layout (note Willard wet cell). Receiver under the cabin roof.



These three of author's many RC boats were selected to illustrate various points illustrated in this layout. Admiral's Barge in the foreground.

electrical tape. If you use commercial receivers, the plastic bags the womenfolk bring home wrapped around the carrots or fruit are ideal. The antenna lead can be taken through a small hole in the bottom of the bag and sealed with a plastic cement. The power cable should have a rubber band twisted around it before it is plugged in. After the final tuning adjustments are made, the mouth of the bag is gathered up around the cable and the rubber band slides down over the bag, sealing the receiver very effectively.

For ease of maintenance, equipment should be removable. All main components should be fitted with plugs and sockets so that, when necessary, batteries, servos and receivers can be removed and tested individually. The mixture of water from spray and oil from fuel can coat everything in the cabin, making frequent inspection and cleaning necessary. A radio boat is a complex piece of mechanism, but regular and frequent checks can halt troubles before they start. If you sail in salt water, it pays to be especially careful. The salt will cause corrosion of many metals and constant cleaning is of utmost importance.

Neatness of installation ranks high, too. A rat's nest of wires all over the boat can be shifted around every time an adjustment is made, changing the loading of the receiver. Wires should be color-coded for ease in tracing connections for troubleshooting. The wiring that remains in the boat when the major components are removed should be neatly cabled and run through a series of small holes in the bulkheads. The holes should be a snug fit for the cable and, if possible, sealed with liquid rubber. This way the bulkheads preserve their watertight integrity. This insures enough buoyancy to keep the boat afloat even if one or more of the compartments are accidently punctured.

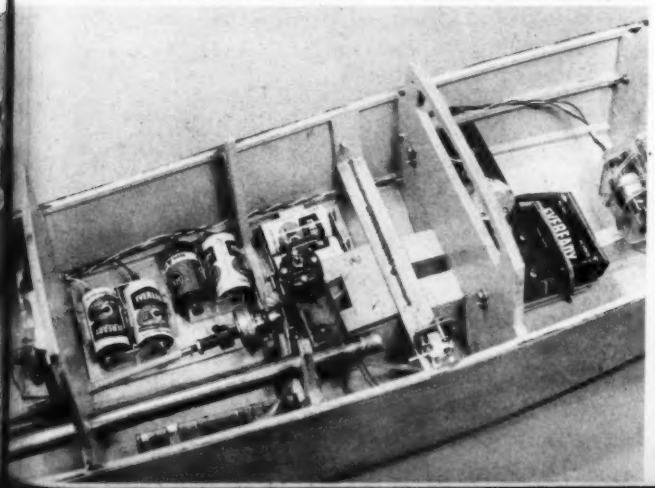
Standardization of cable connections, plugs and sockets is an especially good idea in an RC boat. This makes receivers interchangeable between boats and planes. Provided they use the same plugs, this makes it possible for non-boating types to test their plane receivers in your boat with no risk to their plane.

The installation of the receiver proper is pretty much a matter of individual choice. Vertical mounting can be employed with the receiver suspended from the corners by rubber bands. In boats with removable cabins, the receiver can be nested in a bed of sponge rubber and fastened to the top of the cabin with rubber bands.

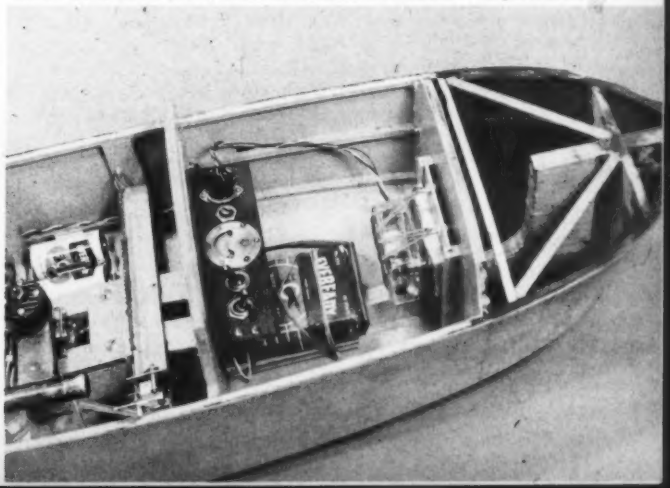
Receivers can be mounted vertically against a bulkhead. A block of foam rubber forms a cushion between receiver and the bulkhead. Rubber bands fastened to four hooks in the bulkhead are looped around the receiver to hold it in place. Another method employs hooks fastened to a plywood slide which rides in runners fastened to the bulkhead. The receiver is fastened to the plywood slide with rubber bands and can be removed, slide and all, in an instant.

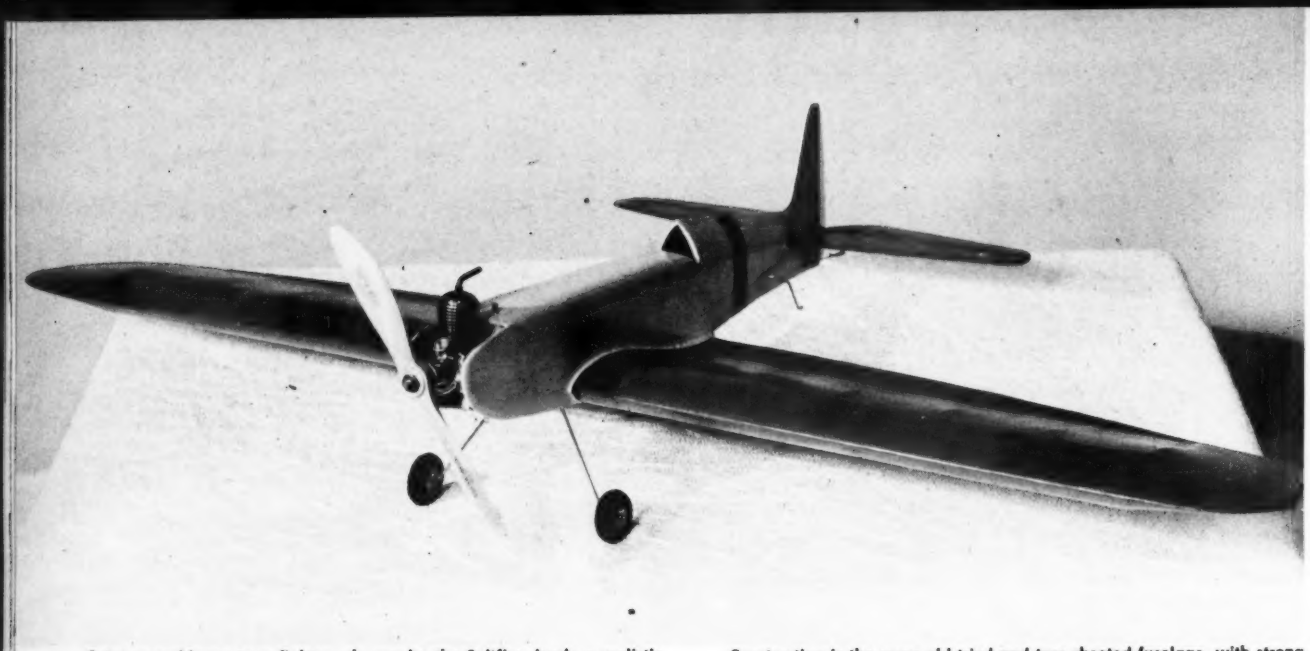
(Continued on page 40)

Midship details boat also shown pictures on left and right. Long exhaust is attached to stack from K & B Allyn .15. Escapement is for two-speed.



Bow details showing sturdy structure to take knocks, then radio compartment. Radio, powerplant, actuators divided into distinct compartments.





Faint resemblance to a fighter, oh, maybe the Spitfire, lends a realistic air to a thoroughly orthodox stunter. Why should stunters look boxy?

Coquette

By DICK CARLSON

Big ship performance in .09-powered stunter resulted from this designer's need for an "apartment-sized model." Mac Diesel does it.

When the McCoy "9" Diesel was marketed, we saw the possibility of using the motor to good advantage in an "apartment-sized" model. Since our interest is primarily with stunt flying and space restrictions prohibit the building of a large stunter, the Diesel seemed to be the ideal answer to our problem.

If the Mac Diesel lived up to its power-size claims, we felt that it should be able to pull a good sized design capable of big model performance. Consequently, we made our model considerably larger than the average .09 stunt job—the end result being a ship that turned out to be a full-pattern flier.

Our first few flights were with the Diesel running rich and the model flew all but overhead eights. When the motor had had sufficient running time, we leaned the needle out and found that we had a superb stunter which flew everything as well as a big job, which speaks well of the smaller 230 sq. in. wing.

The model goes together very easily, since fairly standard construction is used throughout.

Fuselage

Cut the sides and F3-F6 formers from medium 1/16 and 3/32 in. sheet. Cut the nose doublers from 1/32 in. plywood, join them to the inside faces of the balsa sides, then cement the 3/8 in. sq. hardwood motor bearers to the doublers (flush with the top edges). Cut out the 3/32 in. ply formers (F1 and F2) and attach the landing gear to F2 with small machine screws and tin straps. Join the two sides at the nose with F1 and F2, then add the remaining F3-F6 formers.

Construction is the same old tried and true sheeted fuselage, with strong D-sectioned leading edge assembly. No design formula was ever better.

Wing and Stab

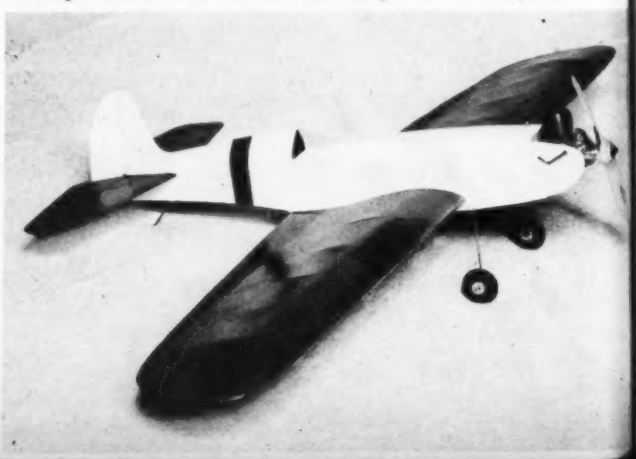
First join the plan drawings at XX to give the full wing layout. Cut out and cement all ribs (med. 1/16 in. sheet) to the lower hard 3/16 in. sq. spar, noting that the left wing panel is longer than the right. Now block up the rib ends and cement the top spar in place. Cut out and cement the med. hard 3/16 in. sheet trailing edge in place. Add the hard 3/16 in. sq. leading edge and the med. soft 1/16 in. sheet top LE covering, dampening the latter if necessary.

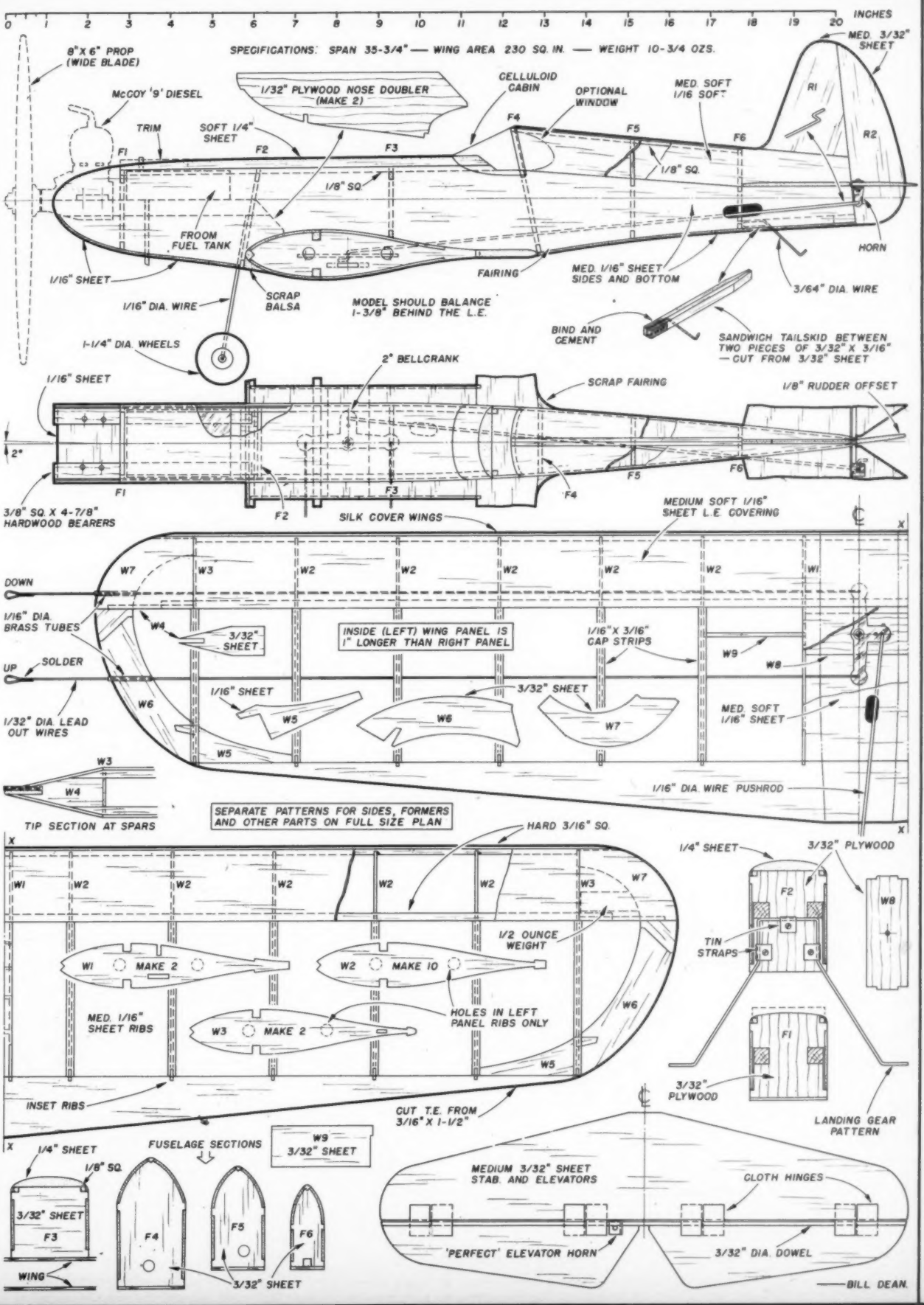
Be careful at this point to keep the wing structure in alinement. Next add tip support W4; tip pieces W5, W6, W7; tip sheeting and the upper and lower cap strips. Install the 3/32 in. plywood bellcrank mount (W8), support W9 and the 2 in. bellcrank. Thread 1/32 in. dia. leadout wires through the holes in the left wing panel and anchor the root ends to the bellcrank. Now install the 1/16 in. dia. pushrod and cover the wing center section. Shape the LE, TE and tips to the sections indicated. Sand wing quite smooth.

Cut out the stab and elevators from med. 3/32 in. sheet and sand them to shape. Cement the elevators to a length of 3/32 in. dia. dowel, then hinge this assembly to the stab with 1/2 in. wide strips of cloth and bolt the elevator horn in place. Cement the stab to the fuselage sides, then add the front portion of the rudder (R1) followed by R2. Note that the latter is offset 1/8 to the right.

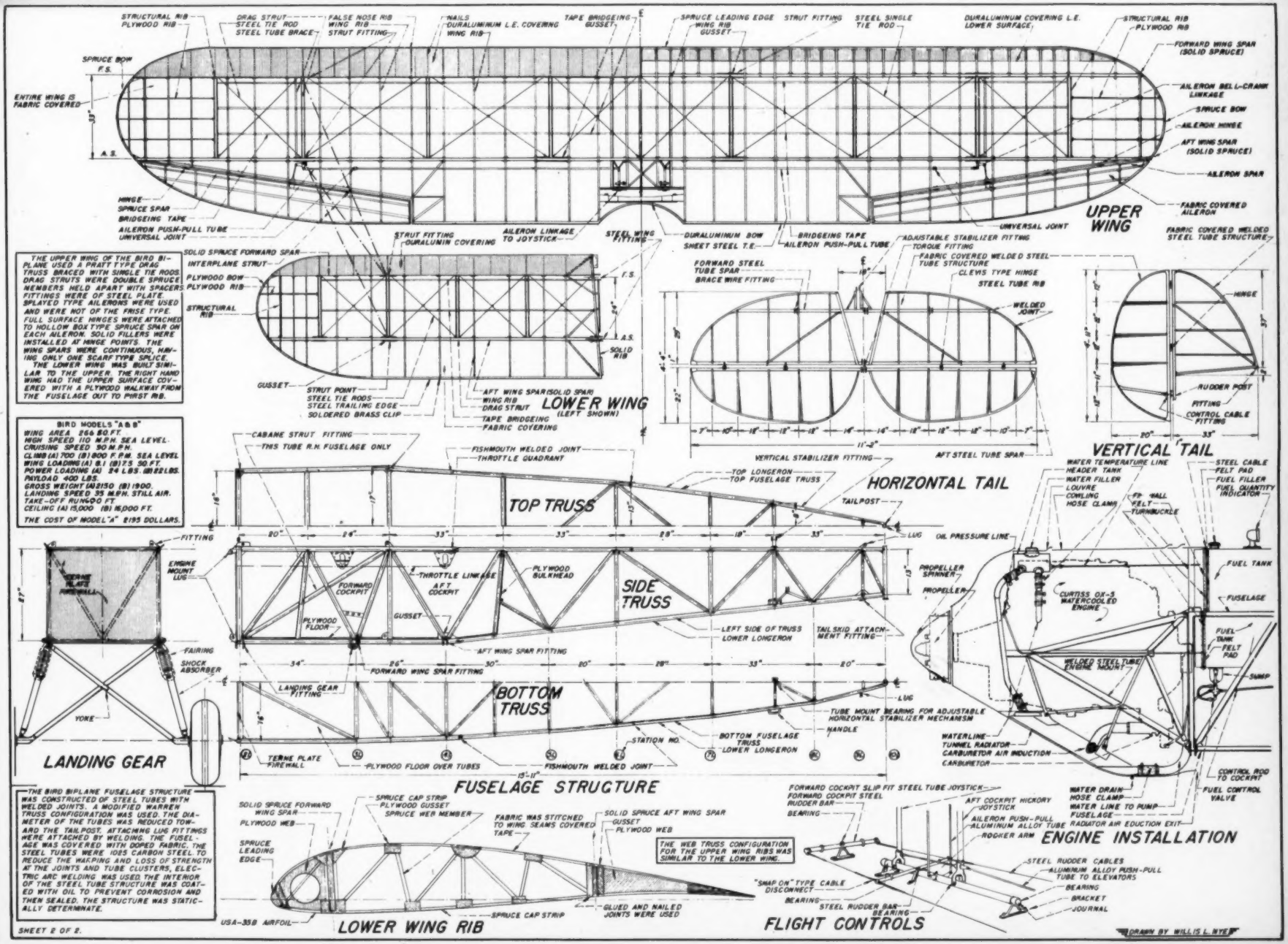
(Continued on page 47)

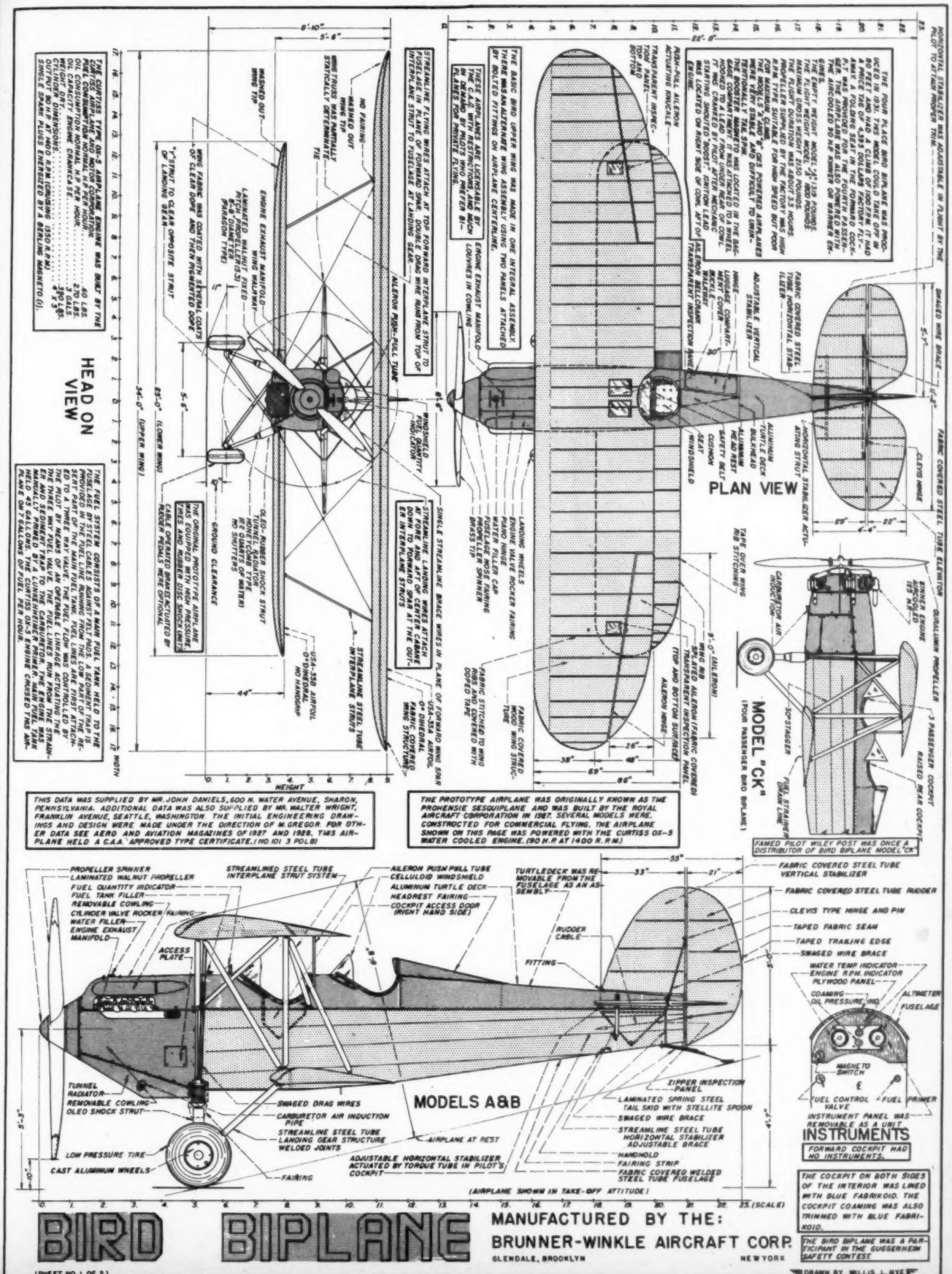
Compare this picture with the plan for such things as the wing cross-section—again one of the niceties of stunt design. Go for that profile?

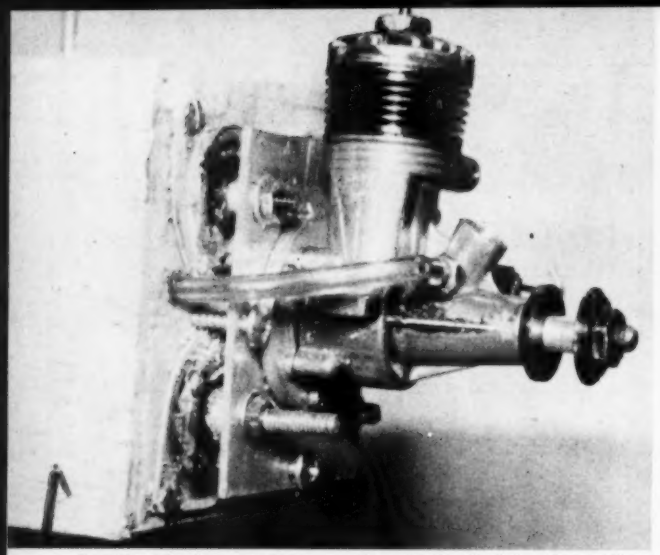




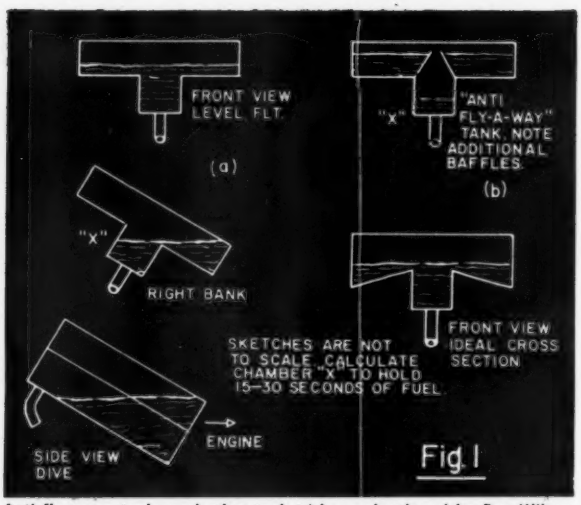
FULL SIZE PLANS AVAILABLE. SEE PAGE 42.


UPPER WING
LOWER WING
HORIZONTAL TAIL
VERTICAL TAIL
TOP TRUSS
SIDE TRUSS
BOTTOM TRUSS
FUSELAGE STRUCTURE
LANDING GEAR
LOWER WING RIB
FLIGHT CONTROLS
ENGINE INSTALLATION
THE UPPER WING OF THE BIRD BIPLANE USED A PRATT TYPE DRAG TRUSS BRACED WITH SINGLE TIE RODS. DRAG STRUTS WERE DOUBLE SPRUCE MEMBERS HELD APART WITH SPACERS FITTINGS WERE OF STEEL PLATE. SPLAYED TYPE AILERONS WERE USED AND WERE NOT OF THE FRISE TYPE. FULL SURFACE HINGES WERE ATTACHED TO HOLLOW BOX TYPE SPRUCE SPAR ON EACH AILERON. SOLID FILLERS WERE INSTALLED AT HINGE POINTS. THE WING SPARS WERE CONTINUOUS, HAVING ONLY ONE SCARF TYPE SPLICE.
THE LOWER WING WAS BUILT SIMILAR TO THE UPPER. THE RIGHT HAND WING HAD THE UPPER SURFACE COVERED WITH A PLYWOOD WALKWAY FROM THE FUSELAGE OUT TO FIRST RIB.
BIRD MODELS "A & B"
WING AREA 266 SQ FT.
HIGH SPEED 110 M.P.H. SEA LEVEL.
CRUISING SPEED 90 M.P.H.
CLIMB (A) 700 (B) 800 F.P.M. SEA LEVEL
WING LOADING (A) 8.1 (B) 7.5 SQ FT.
POWER LOADING (A) 24 LBS. (B) 22 LBS.
PAYLOAD 400 LBS.
GROSS WEIGHT (A) 2150 (B) 1900.
LANDING SPEED 35 M.P.H. STILL AIR.
TAKE-OFF RUN 600 FT.
CEILING (A) 15,000 (B) 16,000 FT.
THE COST OF MODEL "A" 2195 DOLLARS.
THE BIRD BIPLANE FUSELAGE STRUCTURE WAS CONSTRUCTED OF STEEL TUBES WITH WELDED JOINTS. A MODIFIED WARREN TRUSS CONFIGURATION WAS USED. THE DIAMETER OF THE TUBES WAS REDUCED TOWARD THE TAILPOST. ATTACHING LUG FITTINGS WERE ATTACHED BY WELDING. THE FUSELAGE WAS COVERED WITH DOPED FABRIC. THE STEEL TUBES WERE 1025 CARBON STEEL TO REDUCE THE WARPING AND LOSS OF STRENGTH AT THE JOINTS AND TUBE CLUSTERS. ELECTRIC ARC WELDING WAS USED. THE INTERIOR OF THE STEEL TUBE STRUCTURE WAS COATED WITH OIL TO PREVENT CORROSION AND THEN SEALED. THE STRUCTURE WAS STATICALLY DETERMINATE.
THE WEB TRUSS CONFIGURATION FOR THE UPPER WING RIBS WAS SIMILAR TO THE LOWER WING.
SHEET 2 OF 2.
DRAWN BY WILLIS L. BYE


THE FOUR PLACE BIRD BIPLANE WAS PRODUCED IN 1930. THIS MODEL COULD TAKE OFF IN A PRICE TAG OF $3,295 DOLLARS FACTORY FLY-AWAY. IT WAS PROVIDED FOR THE FOURTH PASSENGER WITH A FOLDING SEAT IN THE FORWARD COCKPIT. THE EMPTY WEIGHT MODEL "A" WAS 1,400 POUNDS. THE FLIGHT DURATION WAS ABOUT 3.5 HOURS. MAXIMUM GROSS WEIGHT 2100 POUNDS. THE AIRCOOLED 90 H.P. KINNER OR WARNER ENGINES.
THE BASIC BIRD UPPER WING WAS MADE IN ONE INTEGRAL ASSEMBLY THERE WAS AN ALTERNATE WING ASSEMBLY USING TWO PANELS ATTACHED BY BOLTED FITTINGS ON AIRPLANE CENTERLINE.
THESE AIRPLANES ARE LICENSABLE AND IN DEMAND BY PILOTS WHO PREFER BI-PLANES FOR PRIVATE FLYING.
ENGINE EXHAUST MANIFOLD
LOUVRES IN COWLING
PUSH-PULL AILERON ACTUATING KNUCKLE
TRANSPARENT INSPECTION PANEL TOP AND BOTTOM
AILERON BELLCRANK
TRANSPARENT INSPECTION PANEL
BRACED WING STRUT
FABRIC COVERED STEEL TUBE ELEVATOR
DURALUMIN PROPELLER
3 PASSENGER COCKPIT
RAISED REAR COCKPIT
FABRIC COVERED STEEL TUBE HORIZONTAL STABILIZER
ADJUSTABLE VERTICAL STABILIZER
HINGE — COMPARTMENT COVER
LUGGAGE COMPARTMENT
BAGGAGE COMPARTMENT
SAFETY BELT
CUSHION
WINDSHIELD
ALUMINUM TURTLE DECK
BULKHEAD
ALUMINUM HEAD REST
HORIZONTAL STABILIZER ADJUSTING STRUT
CLEVIS HINGE
PLAN VIEW
TAPE OVER WING RIB STITCHING
CARBURETOR AIR INDUCTION
KINNER ENGINE 90 H.P. AIR COOLED 125 R.P.
30° STAGGER
FUEL STRAINER DRAIN LINE
MODEL "CK"
(FOUR PASSENGER BIRD BIPLANE)
FAMED PILOT WILEY POST WAS ONCE A DISTRIBUTOR OF BIRD BIPLANE MODEL "CK"
HEAD ON VIEW
THE CURTISS TYPE OX-5 AIRPLANE ENGINE WAS BUILT BY THE CURTISS AIRPLANE AND MOTOR CORP.
FUEL CONSUMPTION NORMAL H.P. PER HOUR ..... .60 LBS.
OIL CONSUMPTION NORMAL H.P. PER HOUR ..... 270 LBS.
OIL CAPACITY ENGINE CRANKCASE ..... 3 GALS.
WEIGHT DRY ..... 390 LBS.
CYLINDER DIMENSIONS: ..... 3½" BORE, 5" STROKE
OUTPUT 90 H.P. AT 1400 R.P.M. (CRUISING 1050 R.P.M.)
SINGLE SPARK PLUGS ENERGIZED BY A BERLING MAGNETO (1).
WING TRUSS WAS PARTIALLY STATICALLY DETERMINATE
NO FAIRING
WING TIP
WASHED OUT
ENGINE EXHAUST MANIFOLD
LAMINATED WALNUT WOOD PROPELLER (6.5' DIAMETER PARAGON TYPE)
WING FABRIC WAS COATED WITH SEVERAL COATS OF CLEAR DOPE AND THEN PIGMENTED DOPE
"V" STRUT TO CLEAR COMPOSITE STRUT OF LANDING GEAR
8'-10"
5'-6"
8'-5"
34'-0" (UPPER WING)
44"
5'-6"
GROUND CLEARANCE
OLEO-RUBBER SHOCK STRUT WITH HONEYCOMB TYPE AIR CHAMBERS (NO SHUTTLES)
THE ORIGINAL PROTOTYPE AIRPLANE WAS EQUIPPED WITH HIGH PRESSURE TIRES AND RUBBER DISC SHOCK UNITS
CABLE OPERATED BRAKES ACTUATED BY RUDDER PEDALS WERE OPTIONAL
USA-35B AIRFOIL 0° DIHEDRAL NO STAGGER
STREAMLINE STEEL TUBE INTERPLANE STRUTS
STREAMLINE FLYING WIRES ATTACH AT TOP FORWARD INTERPLANE STRUT TO FUSELAGE AT LANDING GEAR
STREAMLINE FLYING WIRES ATTACH AT TOP FORWARD INTERPLANE STRUT TO WINGTIP AT THE RUNG FROM TOP OF INTERPLANE STRUT TO FUSELAGE AT LANDING GEAR
AILERON PUSH-PULL TUBE
WINDSHIELD
CELLULOID
ALUMINUM TURTLE DECK
STREAMLINE LANDING WIRES ATTACH TO TOP OF FUSELAGE AT REAR AND DOWN TO FORWARD SPAR AT THE OUTER INTERPLANE STRUTS
STREAMLINE STEEL TUBE INTERPLANE STRUTS
STREAMLINE STEEL BRACE WIRES IN PLANE OF FORWARD WING SPAR
USA-35A AIRFOIL
0° DIHEDRAL
FABRIC COVERED WING STRUCTURE
FABRIC STITCHED TO WING RIBS AND COVERED WITH DOPED TAPE
FABRIC COVERED WOOD WING STRUCTURE
LANDING WHEELS
ENGINE VALVE ROCKER FAIRING
PIANO HINGE
WATER FILLER CAP
FUSELAGE NOSE FAIRING
BRASS TIP SPINNER
WING AND AILERON (FABRIC COVERED TRANSPARENT INSPECTION PANEL (TOP AND BOTTOM SURFACE)
AILERON HINGE
9'-0" (AILERON)
26"
38"
69"
86"
HEIGHT
0 1 2 3 4 5 6 7 8 9
THE FUEL SYSTEM CONSISTS OF A MAIN FUEL TANK HELD TO THE FUSELAGE BY STEEL CABLES AGAINST FELT PADS. A SEDIMENT TRAP IS PROVIDED IN THE LOWER PART OF THE MAIN FUEL TANK. FUEL LINES ARE FIRST ATTACHED TO A THREE WAY VALVE. THE FUEL FLOW WAS CONTROLLED BY THE PILOT BY MEANS OF AN OPENABLE LINKAGE ACTUATING THE VALVE. FUEL PASSES THROUGH A STRAINER AND SEDIMENT TRAP TO THE CARBURETOR. THE ENGINE WAS MANUALLY PRIMED BY A LUNKENHEIMER PRIMER. MAIN FUEL TANK HELD 45 GALLONS. THE CURTISS OX-5 ENGINE CRUISED THE AIRPLANE ON 7 GALLONS OF FUEL PER HOUR.
THIS DATA WAS SUPPLIED BY MR. JOHN DANIELS, 600 N. WATER AVENUE, SHARON, PENNSYLVANIA. ADDITIONAL DATA WAS ALSO SUPPLIED BY MR. WALTER WRIGHT, FRANKLIN AVENUE, SEATTLE, WASHINGTON. THE INITIAL ENGINEERING DRAWINGS AND DESIGN WERE MADE UNDER THE DIRECTION OF M. GREGOR. FOR OTHER DATA SEE AERO AND AVIATION MAGAZINES OF 1927 AND 1928. THIS AIRPLANE HELD A C.A.A. APPROVED TYPE CERTIFICATE. (NO. 101 3 POL B)
THE PROTOTYPE AIRPLANE WAS ORIGINALLY KNOWN AS THE PROHENSIE SESQUIPLANE AND WAS BUILT BY THE ROYAL AIRCRAFT CORPORATION IN 1927. SEVERAL MODELS WERE CONSTRUCTED FOR COMMERCIAL FLYING. THE AIRPLANE SHOWN ON THIS PAGE WAS POWERED WITH THE CURTISS OX-5 WATER COOLED ENGINE. (90 H.P. AT 1400 R.P.M.)
PROPELLER SPINNER
LAMINATED WALNUT PROPELLER
FUEL QUANTITY INDICATOR
FUEL TANK FILLER
REMOVABLE COWLING
CYLINDER VALVE ROCKER FAIRING
WATER FILLER
ENGINE EXHAUST MANIFOLD
ACCESS PLATE
STREAMLINED STEEL TUBE INTERPLANE STRUT SYSTEM
AILERON PUSH PULL TUBE
CELLULOID WINDSHIELD
ALUMINUM TURTLE DECK
HEADREST FAIRING
COCKPIT ACCESS DOOR (RIGHT HAND SIDE)
TURTLEDECK WAS REMOVABLE FROM THE FUSELAGE AS AN ASSEMBLY
59"
33"
21"
RUDDER CABLE
FITTING
FABRIC COVERED STEEL TUBE VERTICAL STABILIZER
FABRIC COVERED STEEL TUBE RUDDER
CLEVIS TYPE HINGE AND PIN
TAPED FABRIC SEAM
TAPED TRAILING EDGE
SWAGED WIRE BRACE
WATER TEMP INDICATOR
ENGINE R.P.M. INDICATOR
PLYWOOD PANEL
COAMING
OIL PRESSURE IND.
ALTIMETER
FUSELAGE
MAGNETO SWITCH
FUEL CONTROL VALVE
FUEL PRIMER
INSTRUMENT PANEL WAS REMOVABLE AS A UNIT
INSTRUMENTS
FORWARD COCKPIT HAD NO INSTRUMENTS.
THE COCKPIT ON BOTH SIDES OF THE INTERIOR WAS LINED WITH BLUE FABRIKOID. THE COCKPIT COAMING WAS ALSO TRIMMED WITH BLUE FABRIKOID.
THE BIRD BIPLANE WAS A PARTICIPANT IN THE GUGGENHEIM SAFETY CONTEST
TUNNEL RADIATOR
REMOVABLE COWLING
OLEO SHOCK STRUT
LOW PRESSURE TIRE
CAST ALUMINUM WHEELS
SWAGED DRAG WIRES
CARBURETOR AIR INDUCTION PIPE
STREAMLINE STEEL TUBE LANDING GEAR STRUCTURE WELDED JOINTS
FAIRING
ADJUSTABLE HORIZONTAL STABILIZER ACTUATED BY TORQUE TUBE IN PILOT'S COCKPIT
AIRPLANE AT REST
ZIPPER INSPECTION PANEL
LAMINATED SPRING STEEL TAIL SKID WITH STELLITE SPOON
SWAGED WIRE BRACE
STREAMLINE STEEL TUBE HORIZONTAL STABILIZER ADJUSTABLE BRACE
HANDHOLD
FAIRING STRIP
FABRIC COVERED WELDED STEEL TUBE FUSELAGE
MODELS A&B
(AIRPLANE SHOWN IN TAKE-OFF ATTITUDE)
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 (SCALE)
BIRD BIPLANE
MANUFACTURED BY THE:
BRUNNER-WINKLE AIRCRAFT CORP.
GLENDALE, BROOKLYN NEW YORK
(SHEET NO. 1 OF 2)
DRAWN BY WILLIS I. RYE
STRUCTURAL RIB PLYWOOD RIB
DRAG STRUT ROD STEEL TUBE BRACE
FALSE NOSE RIB
WING RIB
STRUT FITTING
RAILS DURALUMINUM L.E. COVERING
WING RIB
TAPE BRACING
GUSSET
SPRUCE LEADING EDGE STRUT FITTING
STEEL SINGLE TIE ROD
DURALUMINUM COVERING L.E. LOWER SURFACE
STRUCTURAL RIB

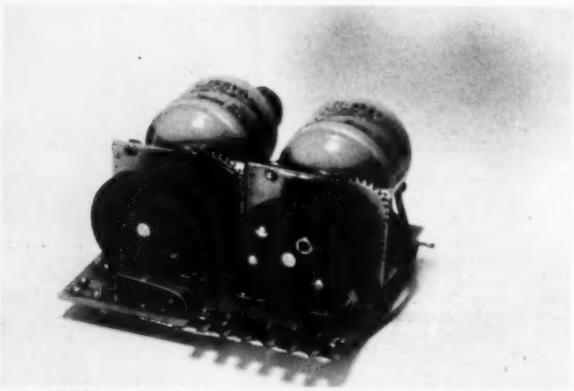


Four No. 4 Lord mounts dampen engine vibration for Robert Drews. Three Phillips head screws provide for adjustments, downthrust, side thrust.



Anti fly-away tanks and other tank tricks as developed by Ron Wilson, England. One variation cuts after determined duration of a spiral dive.

Radio Control News



Latest DMECO servo for boats, cars. Steers by one, two pulses, but a third pulse operates drive motor for reverse, forward, cut-off. Is 3 oz.

New Jaico Gem relay comes 5,000, 7,500 and 10,000 ohms; has two extra tie points for anchoring suppressor resistors, condensers. Weighs ½ oz.

By E. J. LORENZ

Wide-ranging monthly briefing gives you a quick perspective of things you can't afford to miss.

▸ The advent of printed circuitry to the field of radio control has aroused considerable discussion both pro and con on the subject. Lately, builders have written in, wanting to know if it is the thing to use and what limitations it has in this field. Printed circuits—or, rather, printed or etched wirings—are quite adaptable to radio control use. Although it is entirely feasible for an individual builder to lay out and make his own printed wiring chassis, it is to the benefit of the manufacturer to use this new medium. It will provide absolute uniformity in layout for the builder; problems of inter-capacitance between conductors and components are either eliminated or greatly minimized and, if the unit is properly designed, it will be more compact, neater, easier to build and more rugged. This does not mean that all printed wiring chassis will have all of the above features, but they can be attained through proper design.

Even though the copper foil is, generally, .0014 in. thick, it is securely bonded to the base material and will not delaminate in normal use. Only breakage of the base or excess heat in soldering will break this bond between the copper and the base. The current-carrying capacity of a line as small as 1/32 in. wide is more than enough for RC work and it may be as high as 3 amps, depending upon the type of copper and base material. For various and intricate commutator, to be used for pulse work, printed wiring techniques are ideal and often the only way to do the job properly. We believe printed wiring is here to stay, in all forms of electronics and radio work, and its use in government equipment, missiles and computors only proves the ruggedness and reliability of this new type of construction.

For those of you interested in designing your own circuits—and the number is increasing every day—we suggest you start a library of basic technical books. The Sylvania Electric Co. has available, through its dealers, small booklets on transistor circuits, diode circuits, hints and kinks for the electrical experimenter and several others. These booklets, selling for about 25c each, are practical down-to-earth books on every-day type circuits. Every club should have these in their library.

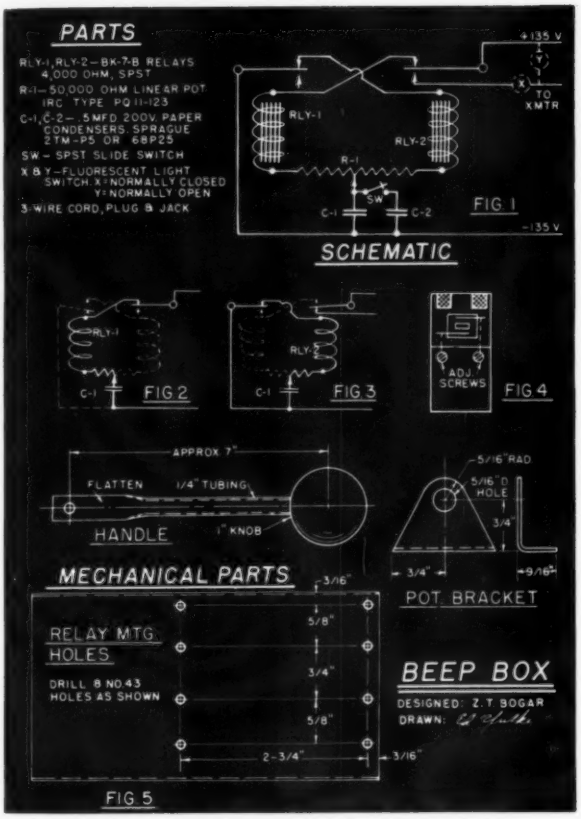
Fig. 1 and the subdivisions give some excellent advice on fuel tanks by Ron Wilson, 21 Harding Sq., Flowery Field, Hyde, Manchester, England. These tanks will correct practically any defect you have in your flying by automatically cutting the engine within a given length of time. *(Continued on page 44)*

FOR THE RC FAN

Electronic Pulser

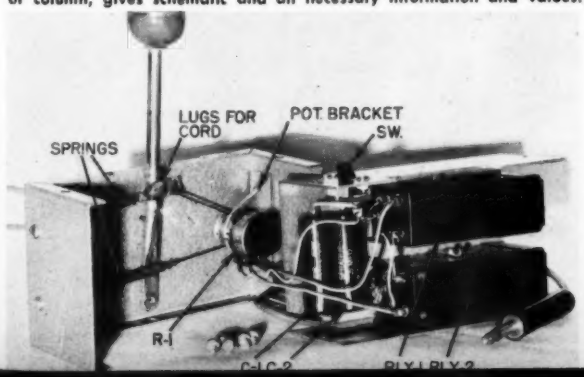
By Z. T. BOGAR

No tubes, no extra batteries, make a simple, smooth pulser. Does the trick.



The knob gives an idea of the relative size—it's small—of the pulser. Working voltages of 130 down to 30, it averages ½ ma steady drain.

Innards fall into place with help of this keyed photograph. Drawing, top of column, gives schematic and all necessary information and values.



A simple, inexpensive, economical pulser gives smooth pulse width and pulse rate variation. It uses no tubes, requires no extra batteries and draws an average of 1/2 ma from transmitter battery. This pulser will be found easy to construct and to understand by the newcomer to RC, yet it gives smooth, steady pulsing for the advanced flier.

The pulser is merely connected in place of the usual key, between the power supply and transmitter, plus an additional connection to B-Minus. It will work on voltages from 135 or higher down to 30, with a pulsing current of 1 ma, which averages to 1/2 ma steady drain. This low drain is especially nice for portable battery work, besides the saving in cost and weight of extra batteries.

Basic Circuit

Fig. 1 shows the basic circuit of this pulser Required are only two inexpensive relays, two condensers, a potentiometer and a switch. It works on the principle of the charging and discharging of a condenser. One condenser is always in the circuit and the second one is merely switched across it to change its value. With one 1/2 mfd condenser, the pulse rate is about six cycles per second, and with the other condenser connected across it, the rate is cut to 3 cps.

A discharged condenser will act as a short circuit and a charged one as an open circuit, as far as direct current is concerned.

Fig. 2 outlines how, when the power is turned on, the condenser acts as a short circuit across relay, winding through the upper, or unenergized, contact of 2. Current entering the arm of Relay 2 and upper contacts will pass through Relay 1, winding through the condenser to ground. Relay 1 will close, opening up Relay 2 circuit. As the condenser charges up, the current slowly decreases until Relay 1 opens. Relay 2 winding is now placed across the charged-up condenser, Fig. 3. Relay 2 closes, applying power to the transmitter, and restores the charging circuit through Relay 1.

As relay winding of 2 connected across the condenser slowly discharges it, the current decreases until Relay 2 opens. This shuts off the transmitter and the condenser is again charged up and the whole thing starts all over again.

Increasing the resistance in the circuit will increase the charging time, and vice versa. With this in mind, when the arm of the potentiometer is moved to Relay 1, charging time is decreased, but discharging time is increased by the same amount and the pulse rate remains the same. The transmitter will be pulsed with a long "on" and short "off" period.

By this same token, moving the arm of the pot to Relay 2 now increases the charging time and decreases the discharging time, leaving the pulse rate again the same. The transmitter now will be pulsed by short "on" and long "off" pulses. Of course, it can be seen that any variation of pulse width is available, depending on the position of the arm of the potentiometer.

With proper relay adjustment of contact arms, armature distance to pole piece and armature spring tension, this pulser will give beautiful linear control of pulse width from 10 per cent on and 90 per cent off to 90 per cent on and 10 per cent off during each cycle.

Construction and Parts

The relays used were BK-7-B purchased from Burstein and Applebee for $1.95. *(Continued on page 33)*

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ECONOMY-SIZE

full pint cans of

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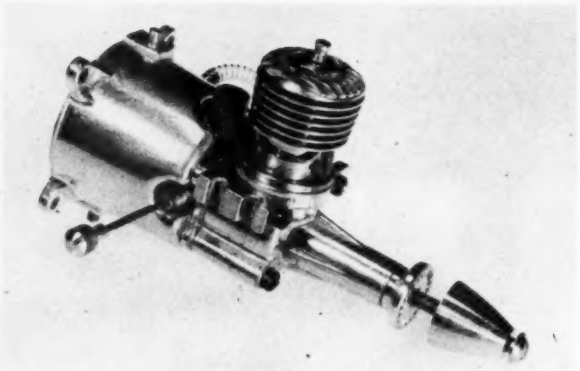
Engine Review

Sensational new features make O & R Midjet .049 engine major contender in Half-A.

By E. C. MARTIN



Chunky, compact, the O & R Midjet here reveals the special, short plug, the huge ports. Needle valve is well away from prop, spares fingers.

Superlatives are so commonplace in this day and age that we tend to disregard them. Once in a while, however, they are true and then the exuberant manufacturer finds that he has already used every super-superlative in the dictionary and he cannot do the new product justice. Perhaps in this case we can help him out, for the O & R .049 Midjet is, in plain English, superlative. This engine could only be made on the most ingenious and up-to-date tooling. It carries model engine production into a phase of tooling competition of even greater intensity than before.

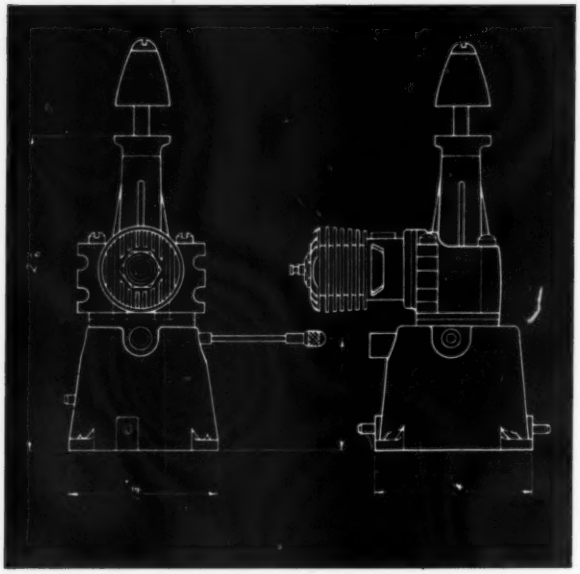
Basically, the Midjet is a twin opposed exhaust, twin opposed internal bypass, reed induction engine with refinements, with the dollar sign at the end, and a brilliant mind at the beginning. Performance sets it apart and is derived from a myriad of small details.

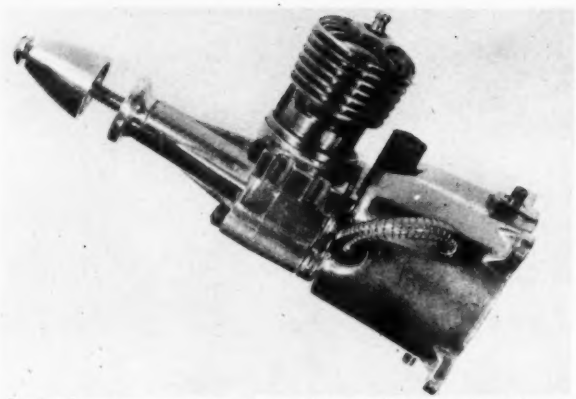
The cylinder and head are integral, having been machined from bar stock in the long established O & R tradition, with fins milled across the head and the cylinder fins extending down to the exhaust ports. The lower end is threaded up to a crankcase joint flange and on the plain portion between the fins and flange the gilding of the lily is riveted in the form of a tiny copper O & R eagle. A glance at the front of the cylinder in silhouette makes one wonder how the top and bottom stay in opposition, for the exhaust ports almost cut it in half with just a small "V" of metal in between at the back and front. Inside the bore this "V" is cut away internally by bypass grooves of such width that lands of only 1/32 in. width are left to steer the piston. About 5/32 in. below the exhaust ports, the bore is relieved to minimize piston drag, so that very little actual cylinder wall exists below the ports and one can only gaze in wonder.

In an engine of this size it is necessary to keep the effective part of the cylinder bore round and parallel within a quarter of one tenth of a thousandth of an inch. This accuracy is normally achieved by honing; however, an integral head makes honing virtually impossible, and in the Midjet this accuracy is actually obtained with a special boring process, with the result that no loose abrasive is used. Those in the industry, overseas especially, will only fully appreciate this.

In order to minimize the internal volume and pocketing effect of the glow plug, an entirely new type has been produced for this engine called the KS-5 which has a 1/4-32 thread of extra short reach with only three full threads. Since the Midjet head is steel, there is no extra danger of stripping the threads, but there certainly would be in engines having aluminum heads.

The crankcase is an unusually rugged pressure diecasting having beam mounting lugs 3/16 in. thick and four full length radial lugs. The joint at the cylinder flange is sealed with a plastic O-ring type of gasket and the reed valve chest joint at the back of the crankcase employs a gasket of a material that appears to be nylon.





Reed valve system is at rear, hence the venturi position. Though major innovations abound, engine also shows attention to those small details.

The main bearing is 13/16 long with a 3/16 bore and a considerable wall thickness amply supported with webs. Oil ways that spiral like rifling grooves extend to a point where they feed oil to a relieved portion of the shaft and thus insure lubrication of the bearing adjacent to the prop driver.

A nitrided shaft of very smooth finish, fully counterbalanced, with splined drive, and relieved for 3/8 of its mid length, is tapped for the prop retaining screw and mounts an aluminum prop driver that is shouldered internally to butt up against the end of the shaft to maintain correct end float. The rather small crankpin receives a full floating bronze bushing that is flanged at one end for location, around which goes the big end of the rod. The conrod is a minor revolution all by itself, being constructed from three separate pieces. The shank is a flat steel stamping with tiny pressed-in sleeves at each end, with the assembly apparently zinc plated. The big end fits on the bronze bushing in a fairly conventional manner, but the little end sleeve actually serves as the wrist pin and engages with a small boss of matching contours coined inside the piston. A small plate having similar contours fits over the rod inside the piston and is retained by a snap ring to complete the bearing. Advantages? The piston has the wrist pin characteristic of not revolving and the ball joint advantage of no pin hole through which compression could leak and no floating pin to trap in the ports. Clever? Very. The piston itself, as a result of this method of conrod attachment, is very light and, being flat topped and symmetrical, unlikely to distort.

The reed valve assembly is carried on what would normally be the backplate and has lugs which register with the radial mounting lugs on the crankcase. Behind it goes the backplate proper which embodies the carburetor assembly.

The reed takes the form of .002 spring steel washer which is retained by two tiny rivets and a kind of dished washer to limit its deflection. The rivets are placed so that about 160° of the washer on either side of the rivets flex in operation. Four ports passing through the valve body in the form of segments convey the mixture to the reed. Since there is a hole through the center of the body which has been plugged and which serves no useful purpose, *(Continued on page 48)*

design detail

Pushrods

By H. A. Williamson

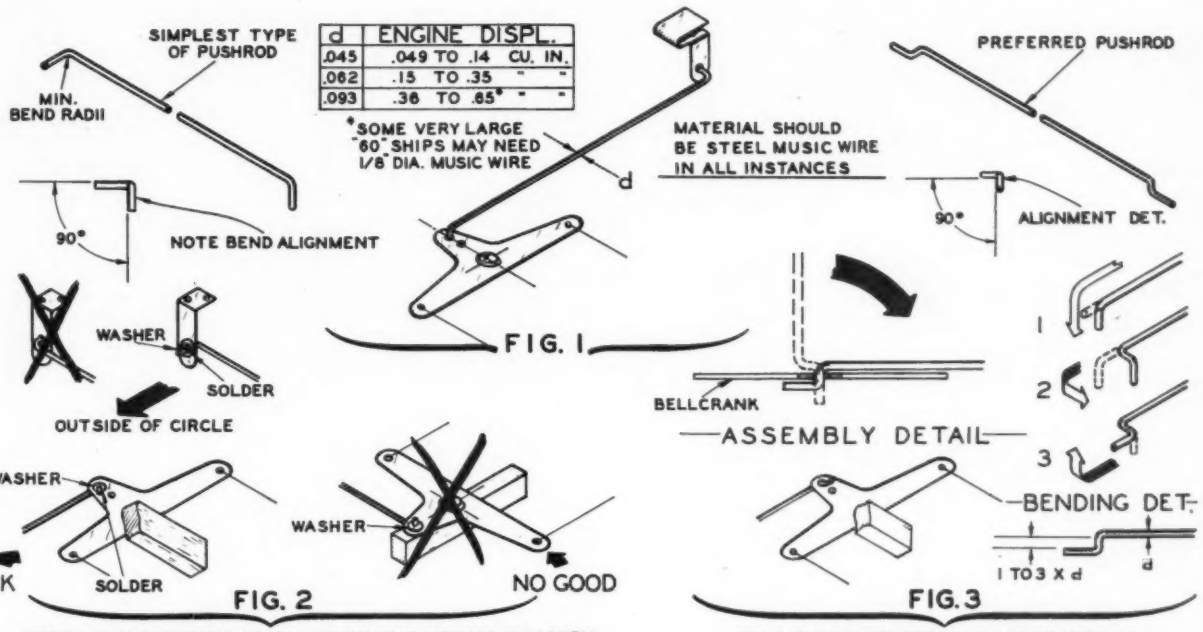


FIG. 1

FIG. 2

FIG. 3

WHEN USING PUSHRODS OF THIS TYPE, THE METHOD OF ASSEM. TO THE BELLCRANK AND CONTROL HORN IS IMPORTANT. TO BE SAFE, THE PUSHROD SHOULD ALWAYS BE LOCATED ON THE INSIDE OF THE HORN AND ON TOP OF THE BELLCRANK.

THIS TYPE IS PREFERABLE AND PRACTICAL UP TO .062 DIA. WIRE. BENDS SHOULD BE MADE CAREFULLY TO AVOID FRACTURING WIRE.

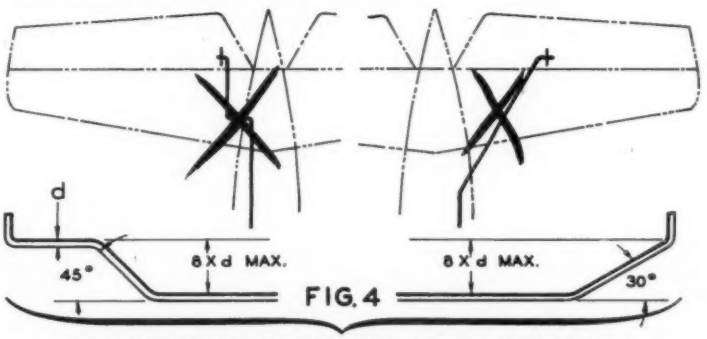


FIG. 4

EXTREME OFFSET BENDS SHOULD BE AVOIDED. HIGH FLIGHT LOADINGS CAN CAUSE SERIOUS BENDING OF PUSHROD WITH A PARTIAL OR COMPLETE LOSS OF CONTROL.

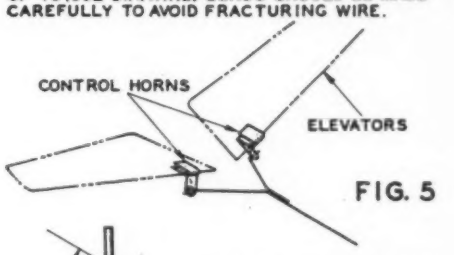
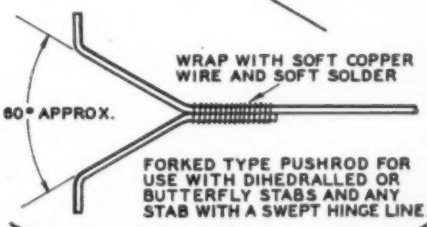


FIG. 5



FORKED TYPE PUSHROD FOR USE WITH DIHEDRALLED OR BUTTERFLY STABS AND ANY STAB WITH A SWEPT HINGE LINE.

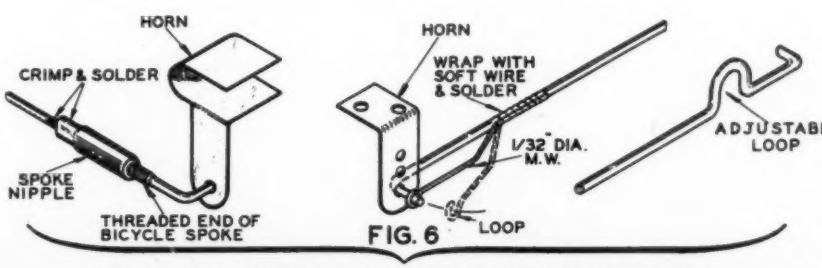


FIG. 6

THREE TYPES OF ADJUSTABLE PUSHRODS ARE SHOWN. FOR THE MOST PRECISE ADJUSTMENTS, THE BICYCLE SPOKE TYPE IS TO BE PREFERRED. THE LOOP TYPE, AT THE RIGHT, IS ADJUSTED BY SIMPLY SQUEEZING THE LOOP TOGETHER OR SPREADING IT APART. THIS TYPE NOT RECOMMENDED FOR LARGER MODELS.

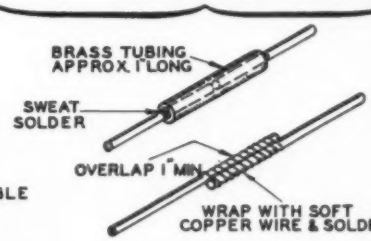


FIG. 7

TWO RECOMENDED PUSHROD SPLICES ARE SHOWN ABOVE. IN BOTH CASES, STRENGTH IS DEPENDENT UPON THE QUALITY OF THE SOLDER JOINT.

P. G. F. CHINN

FOREIGN NOTES

A monthly world-wide round-up of technical developments, designs, significant industrial products.

by P. G. F. CHINN

Royal Patronage for Model Aeronautics

The British model aeronautics movement recently had a signal honor conferred upon it when the Duke of Edinburgh became Patron of the Society of Model Aeronautical Engineers, Britain's equivalent of the AMA. Royal patronage is not bestowed lightly and the recognition that it automatically gives should do much for the prestige of the hobby.

Western Germany: New RC Gear

As first mentioned in the May FN, the German Johnannes Graupner organization (they cover everything: engines, kits, fuels, RC, materials, books, plans) have marketed the first commercially produced 27 mc RC gear in Germany. Known as the "Standard 10" outfit, this gear is now being followed up by a cheaper, lighter and more compact rx and tx known as the "Standard 20" and a crystal-controlled transmitter is also being built for the U.S. market.

The receivers are two-tube units using 3S4 tubes and operate on a 30-volt B supply. The main differences between the original "10" and the new "20" units are in the rearrangement of components in the latter to provide better crash resistance and compactness and lighter weight (2-3/4 oz.).

The "Standard 20" transmitter is a hand instrument. It uses two 3V4 tubes and a 150-volt dry battery supply. Range is claimed to be 1,500-2,000 meters. The case is 10 in. high by approximately 4 in. square and the weight, without batteries, is approximately 30 oz. The "Standard 10" transmitter is more of a heavy duty outfit, operating from a 6-volt storage battery via a vibrator pack for the A supply. A range of over two miles is claimed. With battery, the unit weighs about 15 lb.

Europe: King of the Belgians Cup

The contest for the King of the Belgians Cup, the premier international radio control award, was held on May 21-22 at Essen-Muelheim, Germany and resulted in another win for the well known Belgian Gobeaux team. Second was last year's winner, Kurt Stegmaier of Germany, and deHertog of the Netherlands was third. Britain's Ted Hemsley placed fourth and Germany's RC scale exponent, Hans Lichius, was fifth. Hans Pfeil, who sends us this report, considers that Stegmaier's performance was the most impressive since, despite gusty winds, he flew at a lower altitude where his maneuvers could be more closely scrutinized. Winner Gobeaux also won in 1953 and was third, behind Stegmaier and Lichius, in '54, so it will be interesting to see whether this close rivalry is continued in 1956. Incidentally, Lichius, who, previously, flew a most impressive scale Fieseler Storch, this year had an equally impressive Cessna. Regrettably, he made the error of giving full down elevator instead of up and flew it into the deck.

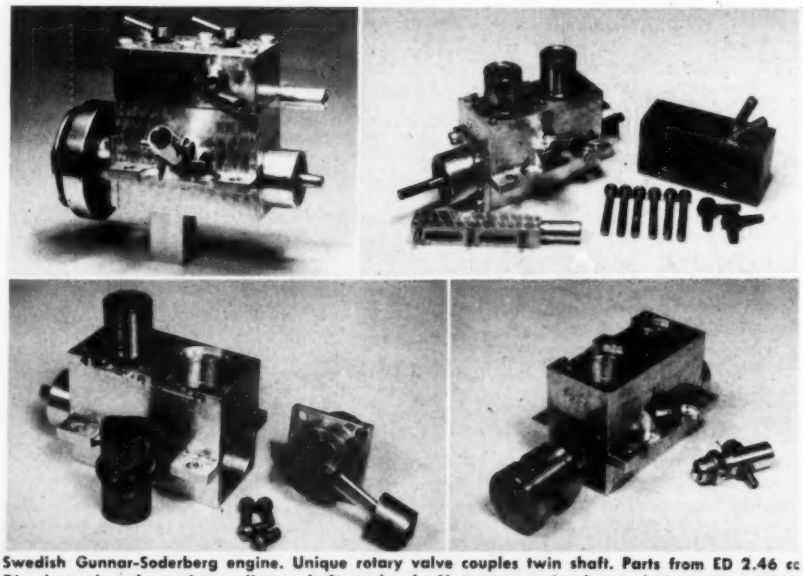
The RC glider event for the Royal Belgian Aero Club Cup, saw a win for Switzerland's Bichel, followed by Osmer of Germany, Seifert of Germany and Mabille of Belgium, who had won the previous year's event.

A feature of the meet was the attendance of a Russian team which did not compete, having had, it was stated, insufficient opportunity for testing and adapting their models to the official frequency. They were, however, unstinting in their praise for Stegmaier's performance.

Noted Australian's Visit

A noted Australian visitor now on a tour of Europe and North America is Jack Hearn, whom we had the pleasure of meeting recently. Jack and his brothers are proprietors of Hearn's Hobbies of Melbourne, Australia's biggest model dealers and importers. Jack told us of

(Continued on page 37)



Swedish Gunnar-Soderberg engine. Unique rotary valve couples twin shaft. Parts from ED 2.46 cc Diesels used, such as pistons, liners, shafts and rods. Note compression levers. It is marine engine.

For The RC Fan

(Continued from page 27)

They are 4,000 ohm with screw driver adjustment for the contacts and a pointer with a graduated scale for the spring tension. These relays will operate on as low as 4-1/2 volts with a nice snap action and will close on as little as .5 ma and open on as low as .1 ma. All connections are at the back to small lugs and the whole relay is enclosed and a dust cover provided over the contact point viewing window. These relays were used because of their good snap action and low cost.

The potentiometer should be linear and have a resistance of at least 10 times the resistance of one of the relays used. In this case, with the 4,000 ohm relays, I used a 50,000 ohm pot. This makes is possible to have a 10:1 ratio on the pulse width variation.

The condensers should be good paper ones. Electrolytic or metallized paper ones will not work properly because of their high leakage. They should be .5 mfd. with 200 V rating. I used Sprague 2TM-P5 or 68P25 condensers because of their physical size, 5/8 x 1-7/8 in., to fit into the box used and the space available below the pot.

The box used was a stock size aluminum one, 5-1/4 in. long, 2-1/4 in. deep and 3 in. high. Be careful about interchanging the position of the last two dimensions.

The template for drilling the holes for mounting the relays, Fig. 5, should be placed on the back of the chassis and the holes marked for drilling for 4-40 screws. Cut away from the front cover the top folded-over lip, making a 2-1/4 in. long slot for the control arm and a corresponding cut-out on the back section of the box to match it.

On the left side of the front cover, drill a hole for a grommet for the cable and two holes for the pot mounting bracket. On the right side of the cover, form two holes for anchoring the springs. Make a small triangular bracket with a hole for the pot shaft at one peak and two mounting holes to match the front cover holes at the other corners, folding over at right angles behind these two holes. Mount the pot on this bracket as shown in the photo.

For rotating the pot. shaft, use a 5/8 in. dia. idler pulley with 1/2 in. dia. trough. Drill out the 1/8 in. center hole with a 15/64 drill, cut the pot. shaft 1/4 in. long, file the edges smooth with a slight taper, and then force-fit the pulley on the shaft.

Make a pencil mark on the pulley and rotate to either extreme and then to the center position. Now, in this position, mark a second point directly opposite the first point and drill a small hole from the trough to the outside at this second point, large enough for two thicknesses of dial cord fish line. Tie a knot in the center of about 18 in. of cord and pull the two ends of the cord through the hole from the outside up into the trough. Wrap cords once around in opposite directions. The top ties to the anchor on the 1/4 in. OD copper pipe, and the bottom to the lower spring. Another spring pulls the pipe back for balance. Flatten the lower end of the copper pipe and drill a 1/8 in. hole and secure loosely to the bottom center of the front cover of the box, 3/8 in. from the bottom, with 1/8 in. rivet and flat washer. Springs are anchored to box through small holes drilled through the ends of 3/8 in. long 6-32 screws.

Mount the relays, after initial adjustment, by eight 1/4 in. 4-40 binding head screws. Mount a SPST switch for changing pulse rate so it will not touch the pot case and the relay contacts.

Wiring

Connect through a grommet in the box a three-wire shielded cable. Black and shield to Relay 1 arm and chassis frame, red to Relay 2

(Continued on page 36)

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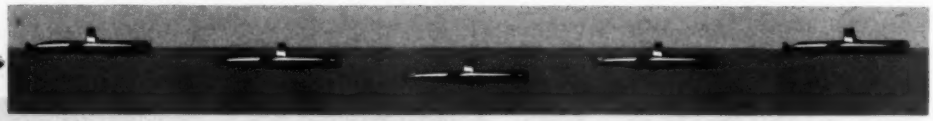

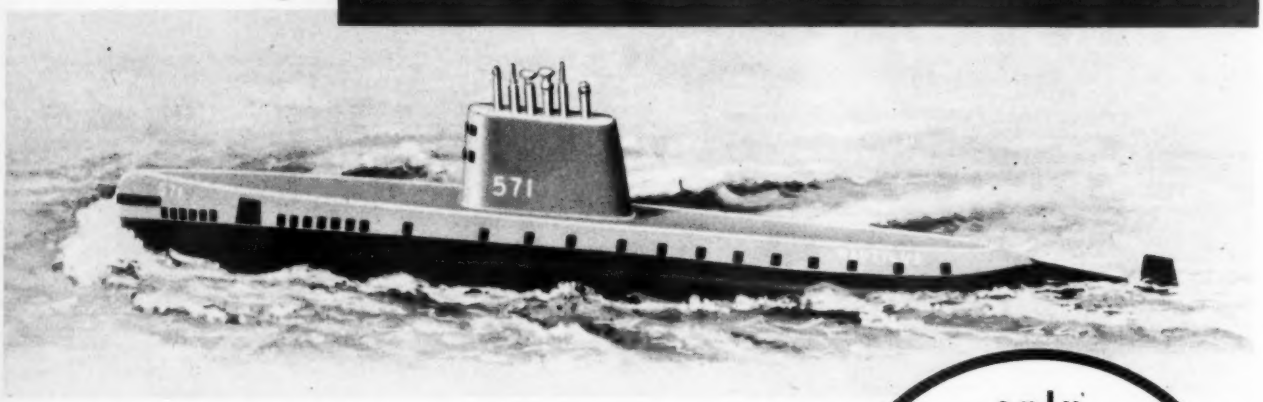

Operating Scale Model of the World's First Atomic Submarine

Big exciting news from Scientific! A real-as-life operating model of the U.S.S. Nautilus! It cruises on the surface of the water . . . submerges to periscope depth . . . then automatically re-surfaces, ALL UNDER ITS OWN POWER! No engine or motor required. It's really exciting to watch . . . even more thrilling to operate! Designed by Walter A. Musciano — who actually worked on the plans of the full-sized Nautilus. The model comes all prefabricated. Assemble the few ready-formed parts in minutes . . . and you're all set for an entirely new and different kind of modeling thrill. The complete kit features a one-piece carved balsa hull (fully half-a-yard long), formed conning tower, adjustable metal diving planes and rudders, rubber powering (U. S. Rubber's T-56), unbreakable high-thrust propeller, finished shafts, decals, etc. All complete except for lead ballast (which you can pick up at any hardware store). If you like modeling . . . you'll love this real operating sub. See it soon at your dealers!

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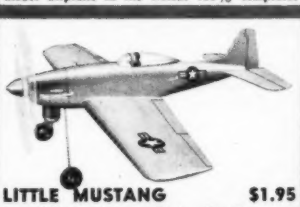
Our extremely popular scale model of the AT6 Trainer. Carved balsa fuselage, etc.



LITTLE MUSTANG $1.95
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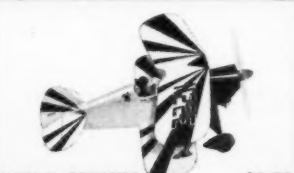

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arm and green to Relay 2 normally open contact. Mount the two .5 mfd 200 V paper condensers flat on bottom of box as shown. Now connect the five wires as shown. For reversing left and right control arm position, reverse the two outside connections on the pot. By the way, should you key your transmitter in the B-Minus lead, then just disconnect the green wire of the cable from Relay 1 and put it on the same corresponding connection on Relay 2. This will give you ground connection or B-Minus to your transmitter instead of B-Plus.

Adjustment

Adjust each relay before wiring into the circuit. Set it to pull in with 1 ma and drop out at .1 ma. If you have not already discovered, the difference between pull-in and drop-out current is increased the closer you allow the armature to the pole piece when it is energized. This is controlled by the "make" contact, which is controlled by the right-hand contact adjusting screw on the end of the relay, Fig. 4. Turning it clockwise will allow the armature to go closer to the pole piece and, counterclockwise, away from the pole piece. The same directions also apply to the other adjusting screws. Be sure you do not turn the right hand screw clockwise so far that it will not make contact any more when the relay is energized. I use a small 0-135 V variable selenium rectifier power supply with a voltmeter and milliammeter for all my RC work and it seems to me this would be a good winter club project for all relay setting and receiver and transmitter testing for the members.

After the initial adjustment of the relays, there are two ways that further adjustment can be made when the wiring is completed. You can use either an ohmmeter, first adjusted to full scale and zero setting, across B-Plus and the connection going to the transmitter, or a milliammeter and variable resistance across the transmitter connection and B-Minus. Using the ohmmeter, be sure that nothing else is connected to the wire going to the transmitter. When using the milliammeter, first place it across B-Plus and B-Minus and adjust to full scale reading (1 ma and 135,000 ohms when using 135 V) and then change the meter connection going to B-Plus to the one that will go to the transmitter.

Turn the pulser on, without the transmitter connected to it, and move the control stick to the two extremes. With both condensers connected (slow pulsing) the meter should show a 10 to 90 per cent difference. The repetition rate should be the same at both ends. If not, make further adjustments, also using the left side adjusting screw on Relays 1 and 2 and varying both spring tensions.

A little time spent on careful adjustment will result in a steady clock ticking hour after hour. The center of the meter swing, you will find, can be smoothly adjusted by the pot to any portion of the meter scale. To determine the effect of voltage drop on the pulser, I slowly reduced the voltage from my test power supply and the pulser kept beating steadily until I got down to 30 volts.

Since the pulser has been written up, it was demonstrated to fellow members of the District of Columbia Radio Control Club, who were pleased with the smooth control over the entire range. After seeing that this pulser does not cut off the signal or turn it on completely, a number have suggested using this as an additional control and placing two push buttons in the circuit, a normally closed push button in position X on the diagram, Fig. 1, to cut the signal off completely when wanted, and a normally open push button in position Y to turn the signal on completely for the additional controls. An inexpensive switch made to order for this purpose is a double push-button (one red and one black) switch used to control a single-tube fluorescent desk lamp, but be sure it is for a single-tube control. On this switch, one button is a normally closed switch and the other is a normally open one.

Foreign Notes

(Continued from page 32)

the many difficulties which plague the model business in Australia, in particular the restrictions on the movement of currency for the import of model materials and equipment, not only from America but from the United Kingdom as well. Import restrictions are, of course, one of the accepted facts of life in most European countries these days—one of the legacies of W. W. II and its disastrous effect on national economies—but it is more difficult to understand why they should be imposed so widely in Australia.

Fortunately, a few Australian manufacturers have come to the rescue with some good products. In this connection, we think in particular of Gordon Burford of Grange, South Australia, who has, for several years, been keeping Australians supplied with good engines, both glow plug and Diesel and in all displacements, at quite moderate prices. An example of his latest engine, a glow plug .35 which is just going on the market, reached us recently and we hope to give an illustrated description of this motor in next month's FN.

Sweden: Unique Twin Diesel

Recently we had the opportunity of stripping and examining an unusual .30 cu. in. twin cylinder motor. Built by Gunnar Söderberg of Stockholm, and utilizing modified E.D. .15 cu.in. Diesel cylinders, pistons, shafts and connecting rods, the motor is for model boat use and has an unusual form of rotary admission valve. Main body of the engine is machined from aluminum with detachable front and rear housings, each carrying two ball bearings to support the two crankshafts which are thus placed back to back. Between the two shafts and running in a bronze bush is then placed the admission valve rotor, which also completes the drive through the two cylinders by connecting the extended crankpins. The cylinder-liners have the bypass ports smoothed out and the piston skirts are cut away to a slipper shape. Water-jacketing is via a monobloc unit which is secured to the base by six screws. Two doubtful points would appear to be the backlash existing in the method of coupling the crankshafts and the small volume of the exhaust manifold, but the engine is nevertheless an interesting and worthy experiment.

England: New RC Record Attempt?

There is no better training for an attempt on an RC duration record than having established a previous record. We have had people tell us frequently of their intentions to break RC duration records. These intentions usually come to nought. Few have previously had a model in the air for more than ten minutes at a time and the preparations for a record attempt are often of a pitifully hit-or-miss nature.

Thus, when Hilton O'Heffernan, who established a radio-controlled duration record of over two-and-one-half hours in October last year (since beaten by New Zealand's Frank Bethwaite with just over three hours) told us that he was hoping to have a shot at regaining the record as soon as weather conditions permitted, this was one occasion when we did sit up and take notice.

Following modifications, O'Heffernan's Sky Sedan has now been tested to .ROG with sufficient fuel and batteries for a flight of over four hours. It is now only a case of waiting for a suitably calm day. Sky Sedan is a 60-in. cabin job designed by Hilton O'Heffernan and powered by a .08 cu.in. Mills Diesel.

Italy's New Half-A

Super-Tigre G.28 is a new .5 cc (.029 cu. in.) from the noted *Micromeccanica Saturno*. We have just received one and it is certainly one one of the best ½-cc Diesels we have yet handled. Job weighs but 1.3 oz. and swings a 6 x 3 at 11,000.

Big Thermals Down Under?

From Jack Dunkerton's New South Wales MAA Bulletin we cull the following item on

thermals at the Aussie Nats: ". . . We saw a young chap from Victoria vigorously towing up a Nordic for an official flight when he stumbled and let go of his launching reel (12-15 oz. plus line) . . . Yes, you guessed it, the model just kept going up with everything attached for several hundred feet . . ." Some thermal. This is *not* a tall story, by the way. Incidentally, we hope that Jack can keep up his superhuman effort in producing the Bulletin. He is editor, typist, printer and office boy. He is also one of the most entertaining modeling reporters we have had the pleasure to read.

British Nationals

We have just returned from the British Nationals event, held, once again, at Waterbeach, near Cambridge. Official results will be in next month's FN. Meanwhile, we might remark that the number of entries did not seem so good for Nationals standards and we often found ourselves looking in vain for something new or really noteworthy.

One bright spot is that the team race lads really seem to have things buttoned up these days. The A class racing (.15 cu. in. motors) was particularly exciting, with Oliver Tiger jobs touching close to 90 mph (not bad for .15's on 52 ft. lines). As the heats progressed, it was confirmed that the finals would be hotly contested between the High Wycombe Club, the country's most successful exponents of A class racing during the previous two seasons, and the Foresters' Club. Both using Oliver Tigers. We put a stop watch on each model and found that the Foresters' job was averaging around 88 mph against High Wycombe's 83-84. A spot of excitement occurred when one of the jobs ran into the circle on take-off and wrapped itself in the lines of another that had just landed. To add to the confusion, a third model landed amidst them, but, in a flash, the lads were running out new lines and were back in the race.

Headgear of the Foresters' pit-crew is worth mentioning. They wore motorcyclists' crash-helmets. Not just flamboyance!

Fifinella

(Continued from page 18)

Stabilizer

Start by pinning down the 3/8 x 3/16 in. spar and the 5/16 x 1/2 in. leading and 3/16 x 3/4 in. notched trailing edges. Cement in ribs and add 1/8 x 1/4 in. top spar and 3/16 in. sheet tips. Plank top and bottom of center section with 1/16 in. sheet and sandwich in the 1/8 in. sheet rudder. Use fairly soft balsa for all components so as to keep the tail lightweight.

Motor Unit

Cut 1/4 in. ply firewall F_1 and cement in 3/8 x 1/2 x 1-7/16 in. maple bearers. Drill alinement peg holes in F_1 and F_2. Drill holes in motor bearers and anchor them to the firewall F_1 with long wood screws. Leave the screw heads extended 1/8 in. to serve as rubber band anchors to hold motor unit to fuselage. Drill holes for engine and add landing gear. Cement in and shape a chunk of soft balsa under bearers and finish cowl by warping 1/16 in. sheet over the top of the firewall and cut to shape. This motor unit arrangement serves a two-fold purpose: ease of thrust adjustments and shock absorption on rough landings.

Flying

Fifinella climbs in a fast right spiral, making about three full revolutions on a 15-second motor run. Her nose never comes down and the ship doesn't hang on the prop. The transition is to a left glide pattern and not a precious foot of altitude is lost.

This set-up is achieved by a little left rudder, left side of stab shimmed up to 1/20 in. and right thrust as needed. Center of gravity is 1-7/16 in. in from the trailing edge of wing.

The original Fifinella is covered with silk and is still going strong. Weight comes out 17-1/2 oz. using Torp. 15. END

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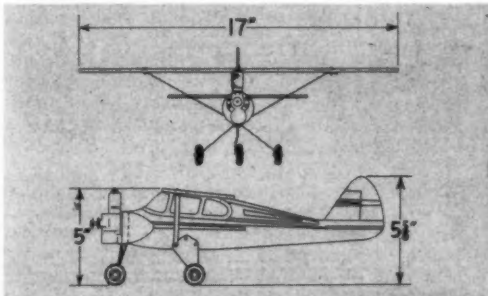

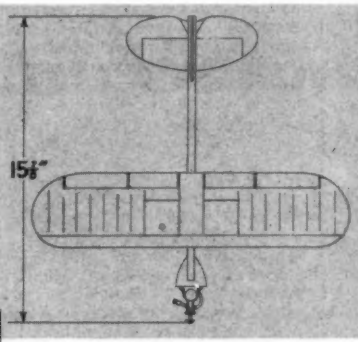

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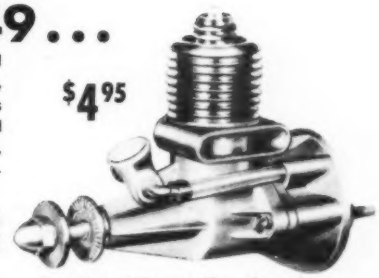

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Thinking of RC Boats

(Continued from page 21)

The main reason for using rubber band or foam rubber cushioning is protection from harmonic vibration rather than protection from crash damage. A combination of off-balance propeller, a slightly unbalanced flywheel and a universal coupling which is not properly lined up can cause vibrations severe enough to cause relay failure. A shock-mounted relay stands a better chance of working without chatter or skip than one mounted solidly to the boat frame.

Battery location is largely a matter of balance. Large B cells are quite heavy and should be kept fairly close to the center of the boat for balance. The A cells can be spotted to balance off-center components.

Batteries should be kept away from exhaust as much as possible. Since most boats are divided into definite compartments, it is usually a good idea to keep only the motor and gas tank, etc., in one, and the receiver and receiver batteries in another. The rear compartments can be reserved for rudder actuators, secondary controls and their associated batteries. All batteries should be kept up off the bottom of the boat to prevent damage from the water that will occasionally collect there. A false floor of plywood may be laid over the bottom, or batteries and battery boxes may be blocked up with scraps of hardwood or hard balsa.

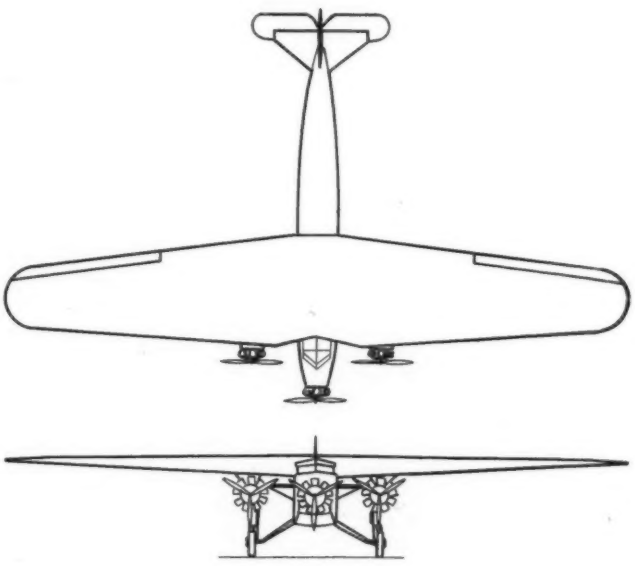
Very few methods of turning the rudder on the market today were designed for boats. Yet, with very few exceptions, most rudder servos can be adapted for use in boats. The popular rubber-driven escapement is perhaps the least suitable. Since the water is so much denser a medium than air, quite a bit of torque is needed to turn a boat rudder. Escapements are suitable for small electric-powered models, but when using gas engines, quite a bit more force is required.

Clockwork escapements are available, suitable for the larger electrically-driven boats and for those powered with small gas engines. Almost any of the motor-driven servos on the market today have enough torque to turn the rudder on a boat equipped with the largest engines. The use of motor-driven servos makes possible semi-proportional control.

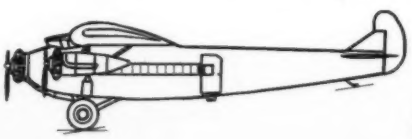
The ability to obtain any degree of rudder movement without regard to sequence is a big advantage when maneuvering in crowded waters. Linkage between servos and rudder should be sturdy and well fitted. Any end play or sloppiness can result in poor centering action and cause the boat to zig-zag instead of holding a steady course. Rudders should be balanced—about 25 per cent behind the leading edge seems to be the best place for the pivot. Rudder shafts should be soldered and faired into a slot in the rudder. If the shaft is soldered to one side of the rudder, it creates a drag which makes it impossible to steer a straight course with the rudder in neutral.

In motor mounting, no matter what method is used, care should be taken to see that the propeller shaft is lined up exactly with the crankshaft. It is usually a good idea to mount the motor and line up the drive shaft before the sides of the boat are planked. This makes it possible to sight down on the shafts and between the stringers. Sighting in two directions makes it easier to line the shafts up exactly. The universal joint should be used to take up only the smallest possible amount of misalinement. If care is not taken on this point, severe vibrations that can cause all sorts of trouble may be set up. Another source of vibration in a gas engine may be an off-balance flywheel. The flywheel imposes no load on the engine while it is running at speed. It supplies the inertia to start the engine. After the engine is running, the flywheel merely goes along for the ride. Since it is so heavy, compared with the engine itself, the slightest imbalance can set up quite a severe vibration.

(Continued on page 42)



FOKKER F-10 TRANSPORT



SCALE
0 5' 10'

The logical starting place for increasing the efficiency and/or speed of a boat is at the PROP. Experiment with different pitch and diameter combinations until the most efficient one is found. Very good propellers can be cut from heavy shim brass and the blades twisted to different pitches and filed to smaller diameters. When the best size is found, a cast bronze prop can be purchased and fitted to the boat. For highest efficiency, any propeller should be filed, sanded and polished as smooth as possible.

There are probably as many types of installations possible as there are types of boats. If the rudder turns every time you key the transmitter, the installation is a good one. The illustrations show in detail an installation in a 36 in. model of an English Admiral's barge which is currently under construction by the writer. Most of the equipment is homemade. The receiver is a Lorenz two-tuber built in a small plastic case. The rudder servo is a "progressive" type working on pulse ratio. The Bonner motor control is actuated by pulse rate change, using the Johnson circuit shown in the April '53 issue of MAN.

To sum up in a few words, don't be afraid to use your imagination and try something new. Make sketches of your proposed installation. Before you attack a single piece of balsa with your trusty razor blade, decide exactly where every wire goes. A little care will add up to a lot of fun. So come on in, the water's fine!

Take Care of That Engine

(Continued from page 11)

last turn or two until definite resistance is felt, then *back off* half a turn. Finally, turn each screw not more than one-eighth turn at a time, working diametrically back and forth across the head.

Needless dismantling of engines is to be discouraged but, sooner or later, you will probably have a legitimate reason for stripping down one of your engines. You may, for example, have the misfortune to dive it into sandy soil. Nothing ruins an engine quicker than dirt and merely shaking the motor around in a can of gasoline or kerosine will not insure that every particle of grit has been removed, since any dirt clinging around the oily intake and exhaust is just as likely to get washed into the motor.

First of all, make sure that you have the proper tools for the job. Don't risk ruining your engine with makeshift tools. Use a screwdriver that *fits* the screw heads. If the motor is one which has Phillips head screws, such as a McCoy, Cameron or Fox, use a proper Phillips screwdriver. If the stripping of any sub-assembly, such as the removal of a ball race from a housing, calls for special tools which you do not have, it is better to leave such a part intact than to risk damage to it.

Some motors — in particular, racing jobs such as the Dooling and McCoy—have lapped metal-to-metal gas-tight joints, but most current types use gaskets. These may be of thin copper, as, for example, on the screw-in Cub cylinder joints, or they may be of a graphited asbestos material as is commonly employed under the head and cylinder joints of the popular .15-.29 glow plug motors. Copper gaskets can be used again, but many of the other type are now rubberized and, since these bond themselves to the metal faces of the joint with engine heat, it is essential to have a replacement set of gaskets for fitting during reassembly.

Our picture sequence deals with the dismantling and cleaning of a popular motor, the K & B Torpedo .15. The sequence, with such variations as differences in structural design dictate, can be applied to most other motors.

First, slacken off all screws. If the cylinder head has become stuck to the cylinder, do not try to insert a tool between the faces. Instead,

(Continued on page 44)

EXCITING MODEL NEWS!

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rotate the parts against each other. The same applies to the cylinder. Inspect each part before removal of the screws to note whether it is possible to replace it incorrectly. Mark the part and its adjacent component with a steel scriber if there is any doubt about this.

Screw-in type cylinder assemblies should be removed with the correct wrenches. Herkimer supplies, at extra cost, a special clamp for removing Cub cylinders. Cox supplies a pair of special wrenches with each SpaceBug or Thermal-Hopper for removing heads and cylinders. Do not, on any account, put a screwdriver or similar tool through the exhaust ports with the object of turning the cylinder: the hard metal is likely to burr the edges of the ports and cause the piston to bind. It is, however, sometimes permissible to use a home-made key of aluminum or dural.

When removing the cylinder, have the crankcase cover removed first so that the crankpin can be held at bottom dead center. If the cylinder has a firm fit in the case, withdraw it with a rotating movement. With many engines (the Torp. 15 included) it is possible to take out the piston and connecting rod intact. With others, it is first necessary to push out the wrist pin.

Finally, the crankshaft is withdrawn from the main bearing. This is straightforward operation with the Torpedo. In some other designs, where the prop driver is a tight fit over splines or serrations on the shaft, it will be necessary to draw the driver off the shaft first. This type of fitting is more commonly used on Half-A motors. A small sprocket puller or chain rivet extractor can be used to draw the prop driver.

The best way to clean the parts is to immerse them in a jar of ordinary gasoline. Any dirt lodged between cooling fins, etc., can be scrubbed out with an old tooth brush. If there are any bits of torn gasket adhering to the cylinder, head or crankcase, these should be carefully scraped off, taking care to avoid damage to the soft aluminum faces of the head or crankcase. Rinse the parts in a second jar of clean gasoline, then lay them out on a sheet of clean white paper.

As it is refitted, each part should be lubricated with a little light machine oil. A convenient way of doing this is to have a paper spill dipped in the oil bottle, with which to apply the oil. Reassemble the engine in reverse order and pay particular attention to accurate alinement and the even tightening of head and crankcase screws. Tighten screws firmly but remember that the case threads are soft and do not over-tighten. If new gaskets are used, a good seal will be obtained without risk of stripping threads.

With the engine cleaned, oiled and reassembled, it now only remains to keep it clean. Plug the carburetor intake and exhaust stack with clean white gauze or tissue. If you are not reinstalling it into a model immediately, wrap it up or put it into a cellophane or pliofilm bag.

Radio Control News

(Continued from page 26)

All tanks may be made from shim brass, if glow fuel is used, and celluloid, if Diesel fuel is used. Section A shows a tank used to cut the engine in case of a spiral dive. As the model banks to one side or the other, the fuel runs into Section X, which is calculated to hold from 15 to 30 seconds' worth of fuel. Note that the fuel line connection is at the rear of the tank, so that, in a dive, the fuel runs to the front of the tank, starving the engine. Now in case you are plagued with fly-aways which take off across the county in a straight line, you should be interested in tank (B) which is so constructed that the model must bank occasionally in order to put fuel into Section X and thus keep the engine running. If the model gets into a straight fly-away position, chances are it won't go into any abnormal bank and

therefore Section X will run dry. These tanks are suggested for sport flying, since contest work imposes other conditions on the attitude of the model.

A photo shows the shock-mounted Torp as used by Robert Drews, 231 S. W. 150th St., Seattle 66, Wash. Bob reports, that, after 80 flights, his Bonner escapement, which is solidly mounted in the plane, has given no indication of skipping or hanging up from engine vibration. This installation uses Lord shock mounts. Why not eliminate or minimize vibration at the source instead of employing tricky solutions to the problem in mounting relays, actuators, receivers, etc.? Frank Schmidt of Erie, Pa. is also a firm advocate of shock-mounted engines as per the September, 1954 issue of MAN.

NEW ITEMS

Thank Paul Runge of Ace Radio Control, Higginsville, Mo. for introducing the first RC bibliography. Transmitters, receivers, plane plans, etc., covering articles in nine publications, are presented on different colored paper for each topic and the bristol board separators have Clearvue index tabs. Each topic has a sentence or two pointing out the prime items of interest.

The new JAICO Gem relay, marketed by the Jaico Products Co., 1921 W. Hubbard St., Chicago 22, is made in 5,000, 7,500 and 10,000 ohm coils and sells for $4.95, $5.45 or $8.40, respectively. This single screw-mounted relay is extremely shock resistant, weighing less than 1/2 oz. Unusual are two extra tie points, used for anchoring arc suppressor resistors and/or capacitors. Pull-in is 1.4 ma and drop-out is 1.2 ma and the size is 3/4 x 17/32 x 1-1/16. Less than 1/2 oz. of weight makes it a candidate for a Quarter-A(?) job.

How about that FCC registration you "were going to send in?"

We'd like to clear up a point which was brought to our attention at the Mirror Meet this year. Someone wanted to know why we plugged so-and-so when we should have known it was no good. Here is our stand: every item we mention has been tried by us, or we state that it has not yet been tested. Each item performs as reported, after having been bench and/or field tested. There are, occasionally, items which we receive and which we do not mention in this column because they do not measure up to the manufacturer's specifications. We are not here to pass judgment on each new item that reaches the market and merely say: "This is okay; this one isn't." Each item presented provides you with a choice in the field and if the piece of equipment you purchase does not measure up to what we say about it and does not meet the manufacturer's specifications for its use or operation, present your story to the manufacturer and we're sure you'll be well treated. Actually, the quality of kits, as one specific item, has improved greatly in the past six to eight months and we've heard no recent complaints.

The Bagdon's Electronics of 1046-48 N. Gay

St., Baltimore, Md. is offering a power pack for 6 volt operation. Featuring a 6 volt DC input and 150 volt output at a high 150 ma capacity, this compact unit sells complete for only $6.95, pre-paid. This is not a surplus item and it is built to close government specs. We can't give the name of the manufacturer, but those who know electronics will recognize it as one of the top names in the field. Complete information on this item is available from the above address. Stocks are limited, so don't delay.

The Chase Products Co., 2807 S. Gardner, Broadview, Ill. has come up with an adhesive in a spray can. Selling in hardware, department and grocery stores for $1.98, this rubber-resin adhesive is known as Stick-All and we've found it excellent for attaching charts, plans, etc. to walls and for cementing foam rubber cushions in place as shock absorbers. It might be a good item in a field tool box. The supply, covering 250 sq. ft., provides an economical method of applying an adhesive for production work.

Just by accident we discovered a very efficient means of "piping" reciprocal motion for uses like engine control. Use a cable release, as on cameras. The German-made units are extremely smooth in operation and will provide about 1/2 to 3/4 in. of travel. The cables may be bent to fairly small radii and the cable lengths are from about 6 in. up to several feet. Prices start at about 85c. Contact your local photographic supply shop.

CLUB NEWS

The first big contest of the '55 season, at least in the East, has come and gone and the Seventh Annual New York Mirror Flying Fair is history. Trends in RC flying were anticipated and with the 114 entrants on the field there was quite a bit of data to pick up. The meet was run under the AMA rules of Rudder-Only and Multi-Channel, and it is perhaps just as well there was a separation, for the Rudder-Only boys showed that a simple receiver and lowly escapement are still to reckoned with. Vincent J. Bonnema took first place in Rudder-Only and Fran McElwee, the old master at the RC event at this contest over the years, again took first place, in Multi-Channel. From second place on down, the Rudder-Only fliers piled up more points per place than their advanced brothers. Fran's plane used a two-tube receiver and a modified set-up of the two Bonner compounds and one self-neutralizing escapement. Fran took first place with what amounted to a single-channel outfit in competition with various multi-channel receivers. We are just pointing this out to show what can be done by the "little man" who does not care to sink a small fortune into elaborate equipment, at least to start with. On the other hand, it must be pointed out that all of the multi-channel equipment on the field was working perfectly and that the fact that none attained first place does not mean it was lacking in capabilities. Seven minute flight time including engine start favored snappy designs. Upon talking to Hal deBolt, who has been flying multi-channel equipment for over two years, and who can perform with the best of them, we got confirmation that a multi-channel set will not make you an ace flier as soon as you take it out of the box. Going from rudder-only to multi-channel is like starting to learn to fly all over again. Practice makes perfect, and pilot error is the biggest cause of crack-ups. If you want multi-channel operation, pick a reliable set and be prepared to practice flying as much as you did with rudder-only.

The Lost Controllers of Wilmington, Del. were on hand with about a half dozen Beams and the Toledo, Ohio club, Weak Signals, showed up with semi-scale Cubs. Hal deBolt went into building a multi-channel set of his own and it really looked good. With but a 150 ma filament drain, this two-channel set, using Neomatic relays, measured about 2 x 2-3/4 x 3-1/4 in. It operated on 200 and 800 cycle

tone and the idling B current was only 1 ma. His Live Wire Champion was complete with rudder and trimmable elevator and engine control was provided for. Hal claims that two channels should give you everything you want. This means, of course, that you must use multi-servos or compound escapements. You probably have gotten into discussions as to whether an RC job should be light or heavy or whether it just doesn't matter. Here again, Hal brought out his new 7 ft. job, which had a wing loading of 10 oz. Ruggedly built, however, it was capable of very tight maneuvers and the contention was that the lower the wing loading, the better. Enough from the Mirror Meet, we'll have to wait and see what the Nats prove.

From Jean L. DeNeuflize, 22 Avenue Friedland, Paris 8, France, came word recently of his success and troubles with a kit version of our two-tuber. It worked fine, right out of box, the first time it was tried at a distance of 300 ft. on a crowded Paris boulevard. The only trouble is that the French "free" band is on 72 mc. The RK-61 has an upper frequency limit of about 75 mc, so that means it'll be pushed in order to operate on 72 mc. However, it can be done. The French builders may also operate in the 27 mc band, provided they use a crystal-controlled transmitter.

The Pacific Northwest Regional Model Airplane meet, held about the end of May, had an RC event which was won by Charles Hollinger and Jim Lackey. Charles took first place in the multi-channel class, flying a scale Cub and using a Babcock BCR-3 receiver and transmitter to give him rudder, elevator and engine control. Jim Lackey took first in the single-channel event, also using a Babcock BCR-3 outfit

The Lakeland RC'ers, LARCS for short, of the Waukesha, Wis. area have no flying field problem, since they have over 2,000 acres at their disposal. This should make some of you drool, all that space. This is not a club but a real live wire group, interested in RC work. Get-togethers of a technical nature are held once a month, with Tuesdays and Sundays being the big flying days. They claim they have enough room in a new 7 ft. pusher for a small boy. There is considerable interest in boats and work is being carried on with amphibians and other float jobs. Contact Bill Deffner, c/o The Hobby Horse, 839 Gaspar St., Waukesha, Wis. and you might be in time to get in on their late summer contest.

Coquette

(Continued from page 22)

Assembly

Hook up the pushrod to the elevator horn and firmly cement the wing to the fuselage. Adjust the pushrod-horn connection so that equal up and down movement is obtained.

Now go back to the fuselage and cement med. 1/8 in. sq. stringer in the upper notches in F4-F6. Cover the decking behind the cabin with medium soft 1/16 in. sheet, trimming to butt against the stringer, and fit against the fin sides.

Install the fuel tank at this stage (a Froom T-24-D or C fits nicely with a little trimming). Cement the med. 1/8 in. sq. front decking supports to the sides, flush with the top edges, then add the soft 1/4 in. sheet front decking. Shape and sand the decking to the sections indicated on the plan.

Add 1/2 oz. of wing weight to the right tip install the tailskid assembly and cover the fuselage underside (at nose and behind wing) with med. 1/16 in. sheet running cross-wise.

Covering and Finish

Cover the wings with Silkspan or silk. Silk results in a practically indestructible wing. Give all sheet surfaces two coats of clear dope and two coats of talc-dope filler. Sand well with a light sandpaper and give the wing enough coats of clear dope to seal the pores of

the covering (lightly sand with a very fine paper).

Our model has five coats of yellow dope on the fuselage and rudder and two coats of blue on the wing and stabilizer. Diesel operation cuts out the need for fuelproofing, so any dope may be used. Paint the cockpit area black and add the thin celluloid canopy which is wrapped over bulkhead F4.

Loop and solder the leadout wires, fit on the wheels and solder washers to the axles as shown. Mount the motor with 2° right thrust and hook up the tank to the venturi with medium sized fuel tubing. Drill a hole in the right nose sheet to clear the needle valve.

Flying

Fly the model on 40-45 ft. long .006 wires, using a small light handle for maximum feel. The McCoy "9" pulls best with an 8 x 5 in. wide blade prop. Feel out the airplane with a couple of rich-setting flights, then lean out the motor and start snapping that handle. You'll be pleasantly surprised.

You can safely fly in any winds you'd normally restrict to bigger craft. Finally, the big advantage with using Diesels, apart from their good power-weight ratio, is the fact that they don't require glow plugs and heavy starting batteries. In fact, you'll find that with Coquette, you have big plane performance plus very low operating costs.

Engine Review

(Continued from page 30)

it appears that the unit was originally designed for a four lobe petal valve which must have proved unsatisfactory, since it was replaced at the last moment by the present arrangement.

The air intake stands up vertically behind the crankcase and is part of the backplate casting. The spraybar is situated at the elbow where the intake joins the induction chest behind the valve ports. Two pieces of neoprene tube are supplied with the engine which form expansions of two different bore sizes for the intake and thus act as restrictors for different suction requirements. Longer pieces may be substituted in order to extend the intake outside a cowling. The needle valve frictioning device is simple, novel and very effective as it prevents any leakage around the needle which in some engines is the cause of erratic running. It consists of a small piece of plastic tubing which is a tight press fit on the spraybar boss and a push fit on the needle shank. In operation it provides just the right amount of friction and positively damps vibration.

The fuel tank, which has four taped holes into which the crankcase bolts screw, is enormous and has one up, one down vents for stunt use with the pick-up tube terminating in the bottom left hand corner looking from the front. The front of the tank is recessed for intake, fuel line and jet needle clearance and the back is sealed by a resin bonded plate. Four radial mounting lugs are provided on a large diameter, equally spaced bolt circle which offsets the considerable overhang between firewall and prop. The plastic fuel line from tank to spraybar is provided with an external coil spring which positively prevents kinks and binds the two line connections. Where the tank is not required, direct mounting is accomplished by means of four cranked brackets which provide clearance for the rear intake and also adapt the mounting bolt circle to match holes that may already have been drilled to suit the tank lugs.

A wrench is supplied which engages with the exhaust ports for cylinder removal and also fits the glow plug.

A machined aluminum spinner, prop retaining screw and steel cable type needle extension with knurled aluminum knob complete the assembly.

In summarizing the outstanding features of this engine, it is fair to say that many of the most potent are extreme developments of ideas

incorporated in several other engines. The cylinder ports are probably the largest of their type that it is possible to cram into a cylinder of such a size and their effect is to produce a gas flow that is somewhat different from that believed to obtain in other engines using this port arrangement. As a result, the manufacturer has patented the system.

The reed valve warrants the same observation in that it is larger and therefore passes more mixture than any other we have seen.

Details such as the rod construction, the spring fuel line and neoprene intake are clever refinements which make a basically superlative engine better.

Operation and Handling

From every viewpoint this is a high performance engine and the only concessions to good performance at low speeds lie in the nature of the reed valve and the gas flow arising from the cylinder porting which probably reduces the amount of charge loss from the exhaust ports at low speeds as compared with conventional opposed port engines. In view of the above, the Midjet can be regarded as a remarkably easy starter, but exhaust priming is imperative for first flip starts unless the engine has been stopped immediately before by choking.

The Midjet will certainly become a top competition engine in its class and a redoubtable opponent for the other reed valve .049. It is very strongly constructed and well equipped for the rigors of U-control, especially in the rod bearing department, which is the weak point on most small engines. Because of the flexible needle and intake placement and extension, it will be readily adaptable to almost any installation and can be dismantled for servicing without disturbing the fuel tank.

TEST: O & R .049 Midjet

Fuel: O & R AA; Plug: O & R KS-5, 1/4-32 as supplied; Running Time Prior to Test: 1-1/2 hours; Bore: .413; Stroke: .370; Weight with Tank: 1-3/4 oz.

Power Prop	RPM
6 x 5	11,800
6 x 4	13,300
6 x 3	15,400
5-1/4 x 5	14,100
5-1/4 x 4	16,000
5-1/4 x 3	17,500
Top Flite	RPM
6 x 5	11,300
6 x 4	12,700
6 x 3	14,200

Flash News

(Continued from page 7)

Now the ratio is five and six to one, will soon hit ten to one. Footage thus needed to slow down a hot plane can be indicated as follows: One plane covers 840 ft. in slowing from 150 to 135 mph, but only 48 ft. in slowing from 15 mph to 0. Drag chutes, reverse thrust, better brakes, arresting devices and, finally, lengthening runways are a few solutions. But stretching a runway is expensive: about $500,000 for just 1,000 ft.

Another headache is spillage of jet fuel on parking and take-off areas. That dropped from conventional planes evaporates quickly. That of jets sticks around long enough to dissolve asphalt. A tar-rubber surface is one answer. But one base, for example, to be surfaced with a tar-rubber surface, will take about a half million pounds of rubber.

The world of tomorrow in aviation always fascinates this column.

Today's planes spend too much time gathering speed for take-off, too long a time getting ready to land. And long runways only offer an enemy more of a target area. Much work is being done secretly on reversing jet thrust to slow planes when they land, maybe halve runway length requirements. Not long ago

the long-haired boys took their hair down in Baltimore. They opined that flying saucers and spheres may not be far off, as attention focuses on planes that can take-off and land straight up and down, change course radically in flight.

What happens when a missile leaves earth at escape velocity, 25,000 mph? It is so far unanswered although astronauts talk confidently of reaching such speeds in the future. Cornell's Aeronautical Laboratory finds that anything moving at 10,000 mph must withstand, even momentarily, a 7,000° F heat.

What is being done to solve the heat problem? Well, for one thing, solar furnaces produce up to 8,500° F heat to test metals, plastics, ceramics and other materials used in planes and missiles. Strangely enough, one of the best solar furnaces is made from war surplus anti-aircraft searchlights. The polished surfaces concentrate the sun's rays into a spot smaller than a dime. See what we mean when we say such things are fascinating?

Contest Calendar

AUGUST

6 & 7—*San Antonio, Tex.:* Class AAA Alamo Regional Contest for FFG, CL, CLC, CLS, RC. CD: C. C. Perkins, 235 W. Drexel, San Antonio 10, Tex.

7—*DeKalb, Ill.:* Class AAA DeKalb Cloud Dusters Flying Circus for FFG, OR, RC. CDs: Dutch Hess & Dale Hindenburg, 137½ E. Lincoln, DeKalb, Ill.

7—*Frederick, Md.:* Class AA Exchange Club of Frederick's 2nd Annual Model Airplane Contest for FFG, CL, CLS, CLC, TR, CLFS, RC. CD: E. E. Champlin, 1002 RoseMont Ave., Frederick, Md.

7—*Boston, Mass.:* Class AA Aero Club Meet for OR, FFG, OHLG. CD: Edward G. Dolby, 25 Exchange St., Rockland, Mass.

7—*Wallingford, Conn.:* Class AA Meriden Model Maniacs' U-Control Meet. CD: Chester A. Orrill, Jr., 47 Carpenter Ave., Meriden, Conn.

7—*Staten Island, N. Y.:* Class AA 5th Annual Metropolitan Championships for RC, FFG. CD: Sal Camnizzo, 293 Maryland Ave., Staten Island 5, N. Y.

7—*Twin Falls, Idaho:* Class AA Magic Valley Model Airplane Contest for OR, TLG, FFG, FFFS, CLFC, CL, CLS, CLC. CD: Ray O. Bush, 755 Blue Lakes Blvd., Twin Falls, Idaho.

14—*Ft. Worth, Tex.:* Cowtown Sahibs' Record Trials—all outdoor events. CD: Ralph Tenny, 608 W. Prairie, Arlington, Tex. Similar contest 9/11, 10/9, 11/13, 12/11.

14—*Arcadia, Calif.:* Class AA Team Racing Contest. CD: Les McBrayer, 1238½ S. 2nd St., Alhambra, Calif.

14—*Alliance, O.:* Class AA Alliance Exchange Club Model Contest for FFG, CLS, CLFS. CD: Edward Cross, 23 E. Station St., Alliance, O.

14—*Beverly, Mass.:* Class AA New England Radio Control Championships. CD: John K. Ross, 23 Lantern Lane, Wellesley Hills, Mass.

14—*Indianapolis:* Class AAA 9th Annual Mid-Western States Model Airplane Championships for FFG, OR, RC, CL, CLS, CLFS, CLC. CD: Roland C. Rhein, 3512 Brouse, Indianapolis 18.

14—*Haddonfield, N. J.:* Class AA 2nd Annual Hi-Way Glo Bugs Team Race Meet. CD: George Moir, Main St., Mantua, N.J.

14—*Bakersfield, Calif.:* Bakersfield Record Trials. CD: Francis Stewart, 900 21st St., Bakersfield, Calif.

20 & 21—*Winston-Salem, N. C.:* Class AA Winston-Salem 6th Annual Free Flight Meet for FFG, OR, TLG, OHLG, FFFS, RC. CD: Lloyd B. Hathaway, City Hall, Winston-Salem, N. C.

21—*Detroit, Mich.:* Class AA 9th Annual Model Plane Contest for CL, CLS, CLFS, possibly TR and/or NC. CD: Warren E. Bartlett, 14515 Asbury Park, Detroit 27, Mich.

21—*Manitowoc, Wis.:* Class AA 2nd Annual Air Pirates Contest for CL, CLS, CLC, CLFS. CD: Wilbur A. Lea, 1030 N. 14th, Sheboygan, Wis.

21—*Plainview, Ill.:* Class AAA 9th Annual Screamin' Demons of L. I., Inc. Long Island Invitational Championships for FFG, HLG, PL, RC, OR, TLG. CD: L. C. Walker, 17 Brookdale Dr., Bay Shore, N. Y.

21—*Kokomo, Ind.:* Class AAA North Central Indiana Championships for CL, CLC, CLFS, CLS. CD: Joseph C. Braun, 106 E. Gano St., Kokomo, Ind.

21—*Danville, Ill.:* Illinois Jr. Chamber of Commerce State Championship Air Meet for FFG, FFFS, RC, TR, CLFS, CLC, CLS, CL, NC. CD: Dick Grack, 17 W. Main St., Danville, Ill. Pending.

28—*Grand Junction, Colo.:* Class AA Exchange Club Annual Contest for CLC, CLS, CLFS. CD: Ralph D. Mulford, 379 S. Redland Rd., Grand Junction, Colo.

28—*Los Angeles, Calif.:* Class AA 6th Annual Free Flight Scale Contest. CD: Robert E. Moncrieff, 2108 Santa Fe Ave., Torrance, Calif.

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28—*Marion, Ill.:* Class AA Marion Lions Club 12th Model Plane Contest for FFG, TLG, OR, RC, CL, CLS, CLC. CD: Edward H. Aikman, 1020 N. Market St., Marion, Ill.

28—*Cleveland, O.:* Class AA 8th Annual ½A Free Flight Contest. CD: John W. Grega, 355 Grand Blvd., Bedford, O.

SEPTEMBER

3 & 4—*Dallas, Tex.:* Class AAA Southwest Model Airplane Championships for all CL events, PAA CL endurance, FFG and PAA. TR events. CD: Maurice Teter, 2025 Abrams, Dallas, Tex.

4—*Lancaster, O.:* Class AA Lancaster Skylarks Club Meet for CL, CLC, CLS. CD: Paul McGrew, 331 E. Main St., Lancaster, O.

4—*Goodland, Kan.:* Class AA Northwest Kansas Gashoppers' Meet for FFG, RC. CD: Kenneth Armstrong, Goodland, Kan. Pending.

4 & 5—*Monticello, Minn.:* Class AAA 7th Upper Midwest PAA-Load Meet for PL, RC, Jetex. CD: Walt Billet, 2541 Nicollet Ave., Minneapolis, Minn.

5—*Far Hills, N. J.:* Class AA Bedminster-Far Hills Lions Club Model Air Meet for CL, CLS, CLC, TR, beauty. CD: C. Marsden Vanderwaart, Lamington Rd., Bedminster, N. J.

10—*El Paso, Tex.:* Record Trials for FFG, OR, TLG, OHLG. CD: Fred Lind, 1610 E. Yardell, El Paso, Tex. Similar contest on Dec. 4.

11—*Hartford, Conn.:* Class AA Greater Hartford Autumn Team Racing Meet. CD: Robert H. Haines, 75 Evergreen Ave., Hartford, Conn.

11—*Inglewood, Calif.:* Class AA Skywolves' Team Race. CD: Don C. Crystal, 805 E. Palmer Ave., Compton, Calif. Similar contest on Nov. 13.

11—*Plainview, L. I., N. Y.:* Class AA New York Aeronuts Model Airplane Meet for FFG, OHLG, RC. CD: Murray Quitko, 410 E. 57th St., Brooklyn 3, N.Y.

11—*Baltimore, Md.:* Class AAA 3rd Annual Friendship Controlline Olympics. CD: F. G. Stroh, III, RFD 6, Pasadena, Calif.

11—*Boston, Mass.:* Class AA New England Wakefield Group Sweepstakes for FAI, Nordic, Wakefield, ½A Gas, HLG. CD: Lee Renaud, 300 Hyde Park Ave., Boston, Mass.

11—*Sacramento, Calif.:* Class AA Oakland Cloud Dusters Third Annual ½A Free Flight Team Contest. CD: Joe Bilgri, 256½ Locust St., San Jose 10, Calif.

11—*Cleveland, O.:* Class A 1st Annual Radio Control Event. Restricted to residents of Cuyahoga County. CD: John W. Grega, 355 Grand Blvd., Bedford, O.

11—*Bakersfield, Calif.:* Bakersfield Record Trials for FFG. CD: Francis Stewart, 900 21st St., Bakersfield Calif.

18—*Perth Amboy, N. J.:* Class AAA Flying Olympics for CLS, CLC, CL, beauty. CD: John P. Gyorfi, 115 Watson Ave., Woodbridge, N. J.

18—*Buffalo, N. Y.:* Flying Bisons 3rd Annual Meet. Pending.

18—*Tulsa, Okla.:* Class AAA 2nd Annual Tulsa Glue Dobbers Southwest Nordic Championships Contest. CD: Willard H.

Kehr, 4940 N. Johnstown, Tulsa, Okla.

18—*West Haven, Conn.:* Class AAA Southern New England Controline Contest. CD: Armand D. Mahieu, 181 Maplewood Ave., Milford, Conn.

24—*Bayville, L. I., N. Y.:* Class AAA Screamin' Demons' 3rd Annual Long Island Sound Hydro Championships for PL, FFG, RC, twin pontoon & flying boat classes of seaplane models. CD: Donald J. McGovern, 81-53 242nd St., Bellerose, N. Y.

24—*Union, N. J.:* Class AA 1st Annual Union Model Airplane Contest for CL, CLS, TR, NC, CLC, beauty. CD: Adam J. Karp, 625 18th Ave., Newark, N. J.

25—*St. Clair Shores, Mich.:* Class AA St. Clair Shores Modelers Proto Speed & Team Racing Meet. CD: Howard Lewis, 21520 California, St. Clair Shores, Mich.

25—*Johnsville, Pa.:* Class AAA Bucks County Federation of Model Airplane Clubs Invitational Contest. CD: Anthony J. Becker, Jr., 2212 Griffith St., Philadelphia, Pa.

25—*Wichita, Kan.:* Class AA "Y" Wichihaws 3rd Annual Contest for FFG, OR, TLG, HLG, RC. CD: Jean P. Valle, 3891 E. Bruce, Wichita 10, Kansas.

KEY TO LISTING OF EVENTS: FFG-Free Flight Gas; CL-Controlline Speed; OR-Outdoor Rubber; TLG-Towline Glider; IR-Indoor Rubber; OHLG-Outdoor Hand-Launched Glider; IHLG-Indoor Hand-Launched Glider; CLS-Controlline Precision (Stunt); CLFS-Controlline Flying Scale; RC-Radio Control; TR-Team Racing; FFFS-Free Flight Flying Scale; PL-PAA-Load; CC-PAA Clipper Cargo; NC-Navy Carrier.

Contests designated "Pending" mean the application is before the proper authorities as we go to press; "Record Trials" mean no prizes, but a chance at cracking the records; "Class A" is a meet with restricted entry; "Class AA" is a meet with unrestricted entry; "Class AAA" is a state-wide or regional meet; "Class AAAA" is a national or international meet.

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2 "T-28"


CURTISS HAWK "P-6E"


10 "T-34-A MENTOR"


3 "P-51"


11 "AT-6 TEXAN"


4 "F-8-F BEARCAT"


5 GRUMMAN "GUARDIAN"


12 "AJ-1 SAVAGE"


"P-40 WARHAWK"


13 "PITT'S SPECIAL"


14 "MINNOW"

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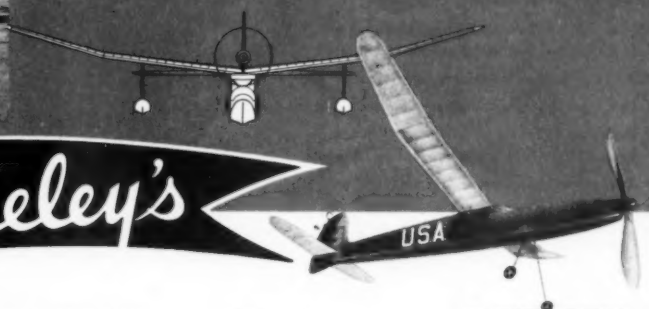

8 "SUPER CLOUD"

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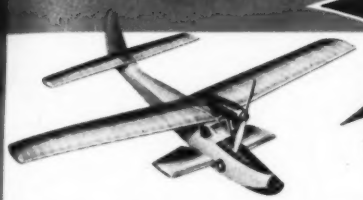

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4 AMAZON "400"

5 "PAYEE"

6 "MINI-HOGAN 34"

7 "SANDY HOGAN"

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Tremendous climb and glide, contest proven

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For .049 to .074 Engines — 50" Wingspan
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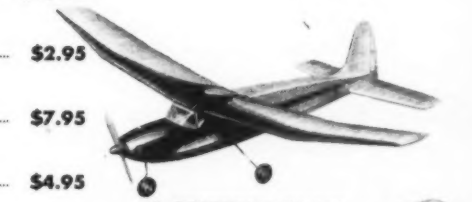
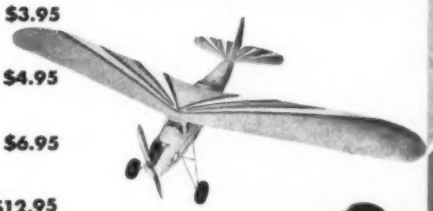


9 BOOTSTRAPS "A-RC"

10 "ROYAL RUDDER-BUG"



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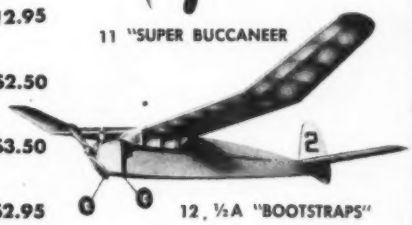
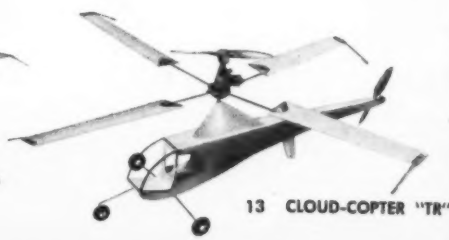


12. ½A "BOOTSTRAPS"

14 CLOUD-COPTER "D-2"



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"PIPER CUB J-3"

For .15 to .25 Engines—71" Span—2" Scale
Weight: 4½ lbs. — 700 Sq. In. Wing Area — 14.2 oz. Loading

The "Piper Cub J-3" needs no introduction. Most famous of all light aircraft, it's a natural for R.C. or Free-Flight flying. The six foot span permits the extra R.C. installation that you dream about. This is a rugged, detailed, flight proven design. Full-Size Plan with R.C. installations, Authentic Decals, etc.

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Controlling your "Cessna 170" by Radio is a thrill you will not forget! Perfect in scale, rugged, stable in all attitudes, yet responsive in control, with good wind penetration qualities. The gear location is ideal for extended take-off runs. The larger than average size makes it easier to control in windy weather.

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Radio Control - Free-Flight - Controline

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- **Formed Metal Ring Cowl**

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Radio Control - Free-Flight - Controline

This high aspect-ratio Canadian Bush Flying type aircraft now is in use by the U.S. Air Force. As a scale design, it is well proportioned and capable of contest performance. In R.C. and Controline flying, its long moment arm make it ideal for spot landings with motor control. Metal Cowl, Full Size Plans, etc.

1" = 1' Scale 48" Wingspan
.049 to .075 Engines—Radio Control
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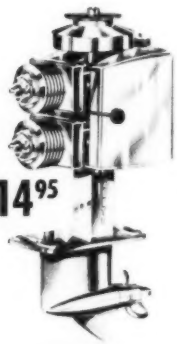
ALLYN CRAFT SPEED RUNABOUT

$4.95 Less Engine

Here is a plastic model boat designed to zoo-o-oom over the waves yet maintain a stable and continuous speed even in choppy water! Its sleek trim design spells speed in every line and its injection molded hull assures enduring strength. Each kit contains the beautiful styron plastic hull, steering wheel, clear plastic windshield, and similated chrome marine fittings. It is 18" long and 8" across the beam. For unmatched performance and the best appearance power your new Allyn CRAFT Speed Runabout with one of the FURY marine engines . . . a thrilling combination!



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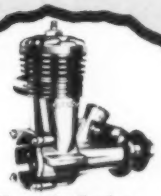
FURY MARINE TWINS. You won't find a smoother or faster engine for your boat than one of the K&B Allyn Fury Marine Twins. Simple to install, the Sea Fury Outboard just clamps on the transom with its adjustable transom bracket; the Sea Fury Inboard needs no engine mounts, universal shaft, or shaft bearings; while the Mar Fury Marine engine incorporates a special drive take-off at the rear permitting free access to the flywheel. All 3 are quick starting and cool running. The Fury line was the first gas-powered engines especially designed for model boats — give your favorite model better performance and greater power with one of the Fury Twins.



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Supersonic Ultra Glo	.55	.90
Supersonic "1000"	.60	1.00

Supersonic "100" only, also available in qts.—$1.45, ½ gals.—$2.75, gals.—$4.90

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Scale Model Plastic Boat Kits
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- Slip On Connectors
- Glow Plugs
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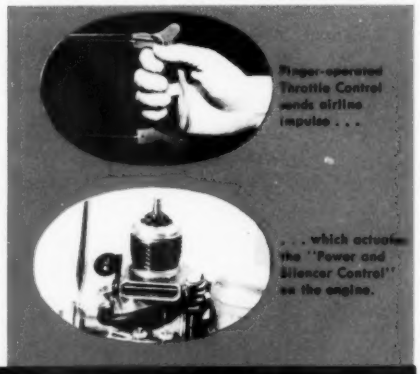

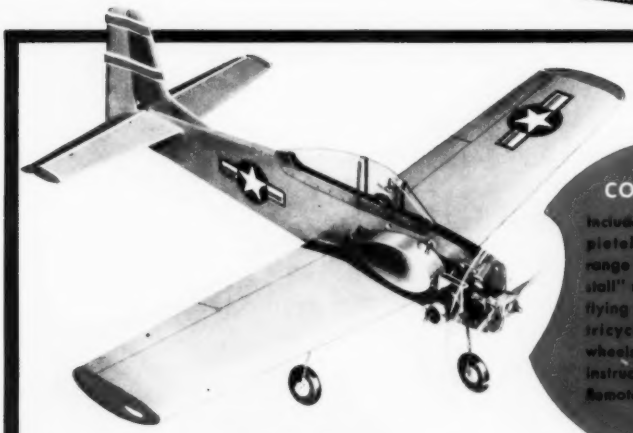

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